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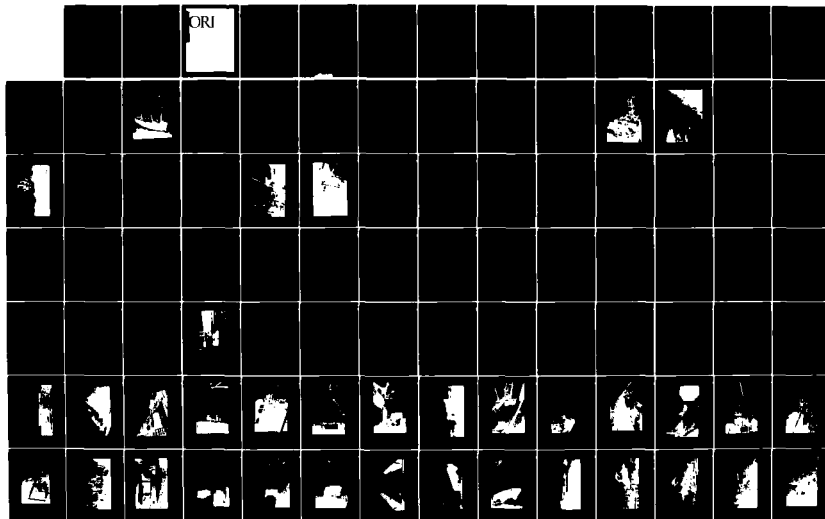
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HEAVY-LIFT BREAKBULK SHIP PRETEST RESULTS OF
THE JOINT LOGISTICS-OVER-THE-SHORE (LOTS)
TEST AND EVALUATION PROGRAM

25 JULY 1977

PREPARED UNDER
CONTRACT NUMBER MDA-903-75-C-0016
FOR THE OFFICE OF THE SECRETARY OF DEFENSE
DEPUTY DIRECTOR (TEST AND EVALUATION)
OFFICE OF THE DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
WASHINGTON, D.C. 20310

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The major objective of the Heavy-Lift Breakbulk Ship Pretest was to determine the capabilities of the Services to use such a ship for deploying selected Logistics-Over-The-Shore (LOTS) equipment to a site where fixed port facilities do not exist. This test was the third of five planned preliminary tests of the Joint LOTS Operational Test and Evaluation Program conducted under the sponsorship of the Deputy Director (Test and Evaluation), Office of the Director, Defense Research and Engineering. The pretest was conducted from anchorages off Sewells Point, Norfolk, Virginia, and Ft. Story, Virginia.

1. SUMMARY

2. INTRODUCTION
 3. BACKGROUND
 4. OBJECTIVES
 5. METHODS
 6. RESULTS
 7. CONCLUSIONS
 8. RECOMMENDATIONS
 9. REFERENCES
 10. DISTRIBUTION STATEMENT

The pretest, conducted 1-9 November, 1976, was part of an evaluation program leading to a major LOTS exercise in August, 1977. The heavy-lift ship was needed in order to verify the capabilities for deploying newly procured LOTS equipment assembled in a near ready-to-use configuration. It was anticipated that a LOTS beach and throughput system could be established more rapidly if equipment assembly requirements were minimized. Operational response time would be significantly improved because the detailed disassembly—required for embarkation aboard conventional breakbulk ships, containerships, and most bargeships—would not be required for the heavy-lift breakbulk ship.

A secondary objective, conducting a container-oriented throughput operation, was added to the pretest by the Services. This objective was included for training purposes and for eliminating potential technical problems during the LOTS main test.

The results of the pretest indicated that equipment could be deployed with minimal disassembly and emphasized the continuing need for the heavy-lift breakbulk ship. Anticipated time savings are on the order of 53 hr in deployment of the 300-ton capacity crane with minimum disassembly. This is compared to the time needed for the more detailed disassembly required when only conventional breakbulk ships are available.

The heaviest item loaded was a 1466-class LCU that weighed 180 long tons. A 1646-class LCU was scheduled for loading but lacked an appropriate sling. A recommendation was made that such a sling be included as part of the ship's equipment. Except for the 300-ton crane, all equipment was loaded/unloaded without difficulty. Handling of the 300-ton crane was complicated by the fact that it was rigged incorrectly. Also it had to be placed in the LCU backwards so that the combined center of gravity of the LCU with the crane was far enough aft to be safe and seaworthy. Consequently, after it was backed out of the LCU, the crane had to be turned around on the beach, a move that delayed the crane's operational readiness for several hours.

During the container throughput phase a temporary containership discharge facility (TCDF), an Army 300-ton lifting capacity crane mounted on a DeLong barge, was used by military personnel to unload containers from a ship

The test results of the pretest, shown in Table C-11, proved the concept feasible and that the test was capable of generating data. This pretest provided an opportunity to determine the amount of derating to be applied to the amount of derating to the power supply. The results showed that, when it is operating on an unstable power supply, the amount of derating is expected to be published in a later report to be published. The test results will be utilized during the LOTS main test.

On 12 May 1968, the ship was moved to form a pier at the beach. The Sealong, a 140-ton crane barge, was beached, picked up, ramps lowered, and used to move the ship to the pier. The pier with the 140-ton crane was used to move the ship to the pier. The pier with the 140-ton crane was used to move the ship to the pier. The pier with the 140-ton crane was used to move the ship to the pier.

The second crane used was the Army's 300-ton capacity crane which was mounted on a crawler chassis and used as a crane-on-beach container loader. The third crane was a 140-ton crane-on-beach which had the inability to reach containers in lighters. Two of the 100-ton cranes--the TCCF's--were successfully and conveniently used to load containers onto the newly ferry, was employed to load containers from the beach using the TCCF, but wave motion and container weight on the chassis made this operation too time-consuming. The TCCF was successfully used to lighter containers at the pier where the deck of the barge where a frontloader rapidly off-loaded the containers onto the truck or other chassis.

the project verified the Services' capabilities for using heavy equipment, including the use of heavy and outsized equipment. The project was successful because of its weight and size, is the largest piece of equipment the Services have used in over 4 years. This opportunity provided the excellent opportunity which will be amplified during the main

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ABSTRACT

The primary objective of the heavy-lift Breakbulk Ship Pretest was to determine the feasibility of the Services to use such a ship for deploying equipment to a site where fixed port facilities are not available. The pretest was the third of five planned preliminary tests of the Breakbulk Ship Pretest and Evaluation Program conducted under the direction of the Deputy Director (Test and Evaluation), Office of the Secretary, Department of Defense. The pretest was conducted from 10 November 1976 to 15 November 1976, at Norfolk, Virginia, and Ft. Story, Virginia.

The pretest, which took place on 10 November, 1976, was part of an evaluation program conducted by the Services in August, 1977. The heavy-lift ship was tested to determine the capabilities for deploying newly procured equipment to a site where fixed port facilities are not available. It was anticipated that a container-oriented throughput system could be established more rapidly at a site where fixed port facilities were minimized. Operational requirements would be significantly improved because the detailed disassembly-assembly required for conventional breakbulk ships, container ships, and lift barges would not be required for the heavy-lift breakbulk ship.

The primary objective of the pretest, conducting a container-oriented throughput system, was achieved by the Services. This objective was in-validated by the results of the pretest, and the elimination of potential problems associated with the system.

The results of the pretest indicated that equipment could be deployed with minimal disassembly and emphasized the continuing need for the heavy-lift breakbulk ship. Anticipated time savings are on the order of 53 hr in deployment of the lift capacity crane with minimum disassembly. This is compared to the time needed for the more detailed disassembly required when only conventional breakbulk ships are available.

The heaviest item loaded was a 146t-class LCU that weighed 180 long tons. A 146t-class LCU was scheduled for loading but lacked an appropriate sling. A recommendation was made that such a sling be included as part of the ship's equipment. Except for the 300-ton crane, all equipment was loaded/unloaded without difficulty. Handling of the 300-ton crane was complicated by the fact that it was rigged incorrectly. Also it had to be placed in the LCU backwards so that the combined center of gravity of the LCU with the crane was far enough aft to be safe and seaworthy. Consequently, after it was backed out of the LCU, the crane had to be turned around on the beach, a move that reduced the crane's operational readiness for several hours.

During the container throughput phase a temporary containership discharge facility (ICDF), an Army 300-ton lifting capacity crane mounted on a barge, was used by military personnel to unload containers from a ship for the first time. A previous exercise, OLCF II, proved the concept feasible on a larger barge using civilian operators. This pretest provided an opportunity to instrument the crane for an evaluation on the amount of derating to the crane's lifting capacity is necessary when it is operating on an unstable (floating) platform. These findings are expected in a later report to be published by a Naval laboratory and will be utilized during the LOTS main test.

A Delong barge was also used to form a pier at the beach. The Delong, with ramps and a 140-ton crane aboard, was beached, jacked-up, ramps lowered, and made operational in approximately 1 1/2 hr. The pier with the 140-ton crane was then used as an unloading facility for containers.

Also tested for the first time was the Army's 300-ton capacity crane which was placed at the high water line and used as a crane-on-beach container unloading facility. Both the 300-ton crane-on-beach and the 140-ton crane on the Delong pier were hampered by an inability to reach containers in lighters at low tide. Amphibians—LAPC-LVs and LAPC-XVs—were successfully and continuously used during calm seas. A causeway ferry was employed to load containers on milvan chassis at shipside using the ICDF, but wave motion and container alignment difficulties with the chassis made this operation too time-consuming. The causeway ferry was successfully used to lighter containers at low tide and over sandbars to the beach where a frontloader rapidly off-loaded the containers and placed them on milvan chassis.

In summary, the pretest verified the Services' capabilities for using a heavy-lift breakbulk ship to deploy certain LOTS heavy and outsized equipment. The only item not considered feasible, because of its weight and size, is the 146t-class LCU. The pretest also provided the first opportunity in over 4 years to conduct a container throughput exercise. This opportunity provided the experience required by military personnel which will be amplified during the main test.

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I. INTRODUCTION

BACKGROUND

The principal objective of the heavy-lift breakbulk ship pretest was to determine the capabilities of the Services to use a vessel of this type to:

- Deploy heavy and outsized, mission-essential, Logistics-Over-The-Shore (LOTS) equipment to an off-shore site,
- Off-load and transport the equipment to shore in landing craft deployable aboard the ship, and
- Prepare the equipment on the beach for LOTS throughput operations.

A secondary objective, conducting a container-oriented throughput operation, was added to the pretest by the Services for training purposes and for identifying potential unforeseen technical problems during the LOTS main test. These objectives were accomplished in an exercise conducted November 1-9, 1976. The test began with the ship at anchorage in Hampton Roads, Virginia, where equipment was loaded and continued off Ft. Story, Virginia, where ship discharge and throughput operations took place.

The heavy-lift breakbulk ship pretest also offered a less obvious but important feature besides verifying the deployability of new equipment. There is rarely an opportunity for deployment of very large and heavy equipment, especially if handling by military personnel is required. The paucity of heavy-lift ships and the cost, difficulty, and infrequency of repositioning outsized, heavy equipment have diminished the familiarity and skill of military personnel in dealing with such equipment. Accordingly, it was found that some "rediscovery" of the special equipment and handling considerations was necessary for supporting this type of operation.

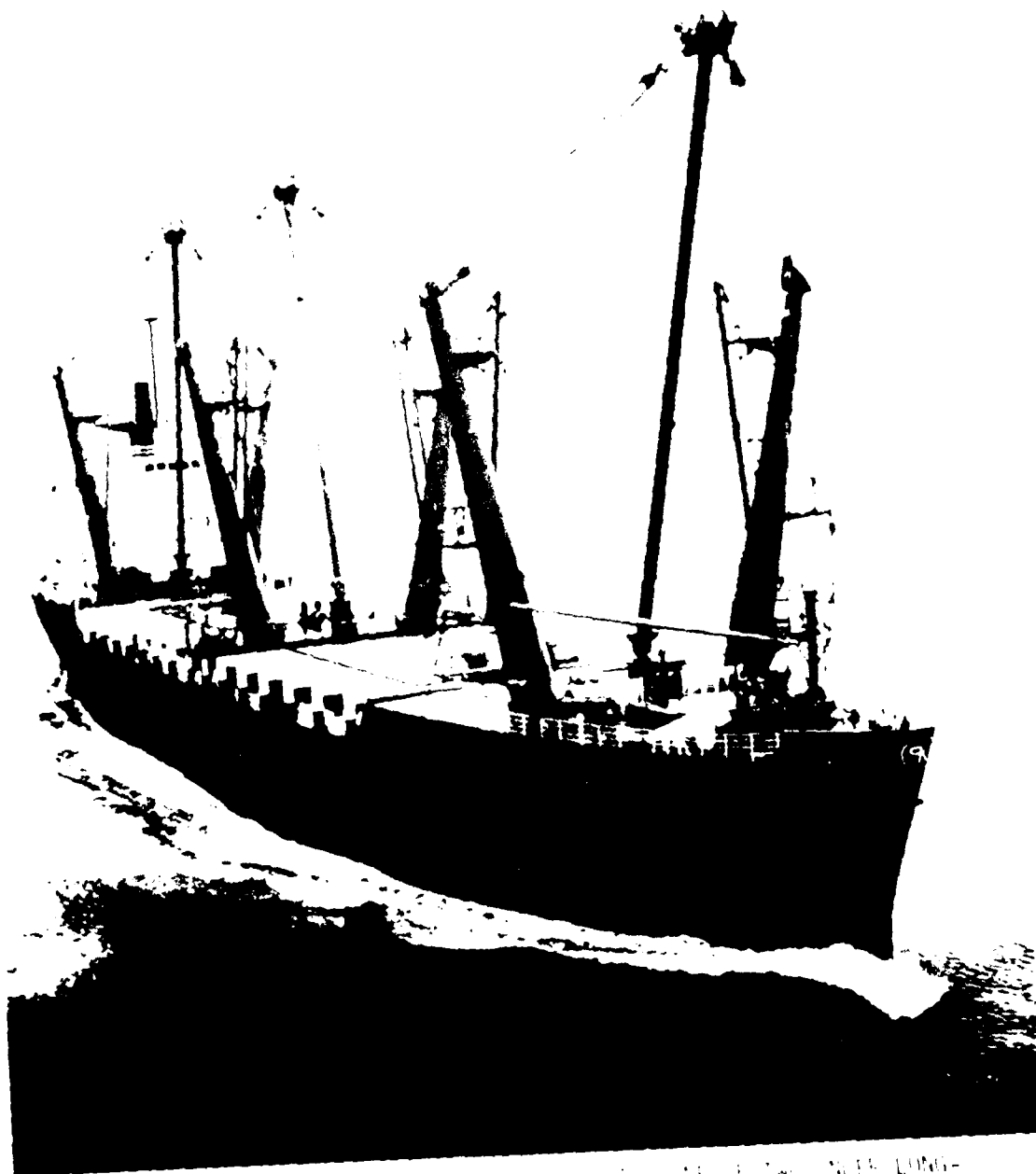


FIGURE 1. A RECENTLY DESIGNED FREIGHTER SHIP WITH LONG-
RANGE CAPABILITY

heavy items such as L-100s, L-100s-L10s, and locomotives. Second, there are three 120-ton ton stowage booms, 100 ft in length which permit loading large heavy items in holds 2, 3, and 4. The 100-ton booms can also be paired to work together giving the ship a nominal 240-ton lifting capacity, permitting the hoisting of an L-100. A total of four L10s can be stowed on the main deck. Figure 1 illustrates the capability for use singly or paired. The general characteristics of the two heavy-lift breakbulk ships are contained in Table 1. Appendix A contains more detailed information on ship characteristics.

TABLE 1
GENERAL CHARACTERISTICS
S.S. TRANSCOLORADO AND S.S. TRANSCOLUMBIA

Type of vessel: Single screw 10-10-10 transport converted to the cargo ship having a heavy-lift capability of 240 tons. Vessel was originally built in 1945 and converted by Newport News Shipbuilding and Dry Dock Co., Newport News, Virginia in July 1964.	
Length overall	500 ft 10 in
Length between perpendicular	496 ft 10 in
Breadth molded	71 ft 6 in
Depth to main deck at side molded	40 ft 6 in
Draft to assigned waterline molded	30 ft 4 in
Displacement in salt water	11,700 tons
Deadweight	11,475 tons
Shaft horsepower - normal	9,100
Continuous sea speed	16 knots
Load ship characteristics	
Displacement	11,225 tons
Vertical center of gravity - AG	27.93 ft above keel
Longitudinal center of gravity - LCG	236.94 ft fwd of A 1
Officers and crew	38
Number of cargo holds	5

* The TRANSCOLUMBIA's master and chief mate reported that on one occasion the ship had loaded and discharged a 300-ton tugboat.

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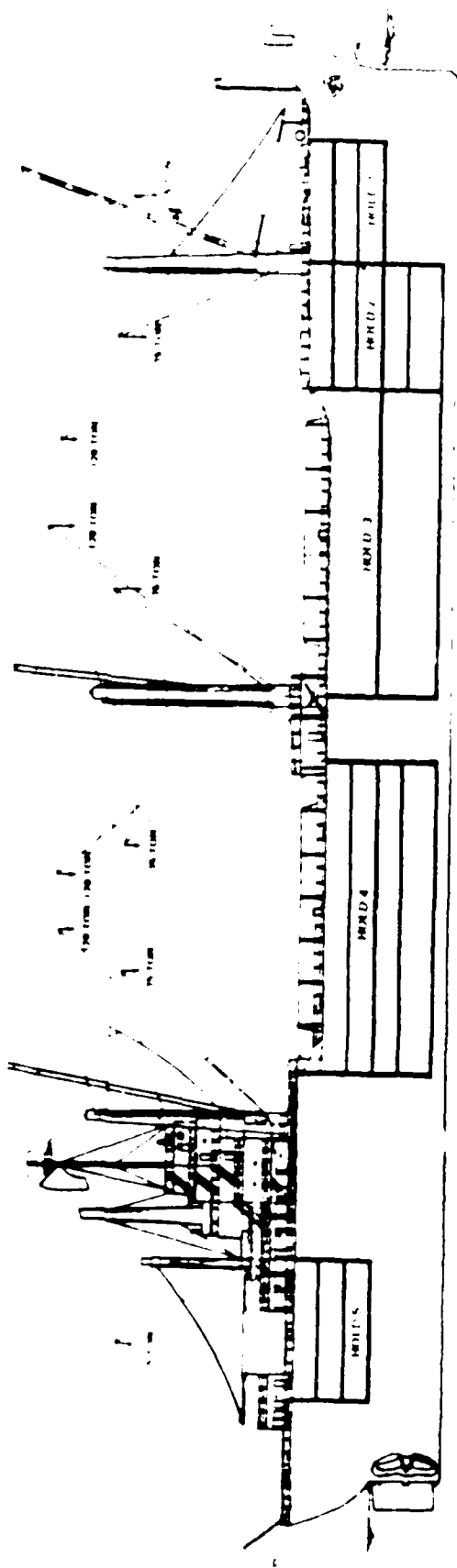


FIGURE 2. HEAVY-LIFT BREAKBULK SHIP PROFILE

1000-1000

The two lifts originally selected for this pretest were the heaviest and most complex lifts required for existing standardized cargo at a 1000-ton test area. The heaviest lift was a 100-ton lift. This criteria eliminated, initially, all the light and medium lifts. The characteristics of the lifts selected for this pretest are given in Table 1.

The lifts originally selected in the preliminary test design report were not tested. The reasons are:

- The 100-ton lift, originally selected, could not be made available to the test area for developmental tests.
- The 100-ton lift, originally selected, was considered a redundant lift since its equipment was being tested in a separate developmental test which had design capabilities.
- The 100-ton lift, originally selected, had been rejected for the pretest.
- The 100-ton lift, originally selected, was not available.

The heavy lift (100-ton) was an LCM-1000. It is needed to transport the heavy lift to the test area. The heavy lift is a tactically disassembled configuration. A tactical disassembly of the crane is defined as the minimum disassembly required for crane deployment overseas. In a tactical disassembly the crane, which was the original lift, has all sections of the boom except the boom tubes removed along with the counterweights and out-rigger floats. The weight of the crane is approximately 100 tons (from approximately 100 long tons). The crane is disassembled in the test. This is as opposed to the crane being disassembled into components of less than 100 tons. The crane is disassembled and required 1 to 2 days for reassembly.

The 100-ton crane (100-ton lifting capacity) is smaller and lighter than the 100-ton crane and is a suitable load for an LCM, which has a capacity of approximately 100 short tons and can be deployed on most commercial ships. In the 100-ton pretest the 100-ton crane was loaded into an LCM but loading from a heavy lift breakbulk ship presented different problems discussed in detail later in this report.

Initially, the LCM-1000 was embarked for the first time in the 100-ton pretest series. The heavy-lift breakbulk ship was the only ship tested that had the required capacity (more than 100 long tons) and space available to load and discharge the LCM-1000.

The heavy lift ship in this instance refers to the Army of Long Pier and the heavy lift breakbulk ship discharge facility (HBLF). The latter is a facility with a large crane mounted on it. The ship is positioned alongside a pier ready for unloading operations.

TABLE 2
HEAVY-LIFT SHIP PRETEST PLANNED LOADS

Lifts Planned	Characteristics					Remarks
	Lift Made	Length (Ft)	Width (Ft)	Height (Ft)	Weight LTons	
40-T Model (170-ton lifting capacity) crane, tactical disassembly	Yes	57.6	12	13.5	98	
40-T Model (114-ton lifting capacity) crane, tactical disassembly	Yes	48.5	11.3	9.4	42	
40-T Model	Yes	62.5	26.6	15.3	88	
240-T-Class LCL	Yes	119	34	17.8	180	
240-T-Class LCL	No	135.3	29	17	151.8	No sling available
40-T Model Sideloader	Yes	41	12.5	11.7	64	Top handler removed.
Clark Frontloader	No	30.5	13.2	16.5	69.3	Not received in the inventory. Top handler (6-Tons) removed.
ADV-30	No	76.3	33	21.5	27.7	Not available for loading
3 x 15 Causeway Section	No	90	21.3	5.1	60.3	Lift was redundant*
10-Ft Milvans	19	20	8	8	-	Weights varied by container
8-Ft Container	1	40	8	8	30	
* See ORI Technical Report No. 1037.						

MEASUREMENT AND OBSERVATION

During the equipment deployment aspects of the test the most important job was to check the physical feasibility of moving the LOTS equipment with the ship's crane and, once in the objective area, making the equipment ready for the lifting operations. Thus, observations were concerned with matters of proper clearances, centers of gravity (did the item hang in an appropriate position), proper fit of lift slings with lift points, any pendulation problems while in the air, etc., and the like. Times required for deployment of the equipment items were measured to support main test planning. Crane cycles and throughput data samples were also obtained. The throughput rates and the factors that influence them were additional inputs to main test planning.

During the ship off-loading measurements were made of the sea state and motion of the LCI platform. An ancillary test to measure the stresses on the components of the LCI was also conducted. These measurements, made by personnel from the Naval Civil Engineering Laboratory at Port Hueneme, California, will be the subject of a separate Navy report. The results may assist the Joint Test and Evaluation program by establishing better safe working limit criteria for the LCI crane working in this environment.

Finally, observations were made of the way various equipment functioned in the environment and of cargo documentation and control procedures.

III. OPERATIONS

1. PRETEST OPERATIONS

Pretest operations began about 0700 hr November 2, 1976, with the LARC-IX at anchor off Sewells Point in Hampton Roads. Weather conditions throughout the loading and discharge phases of the pretest were clear with a light-to-calm wind and calm seas at both the Sewells Point anchorage and off Blue Beach, Ft. Story.

Preparations for loading required approximately 3 hr and included the opening of hatches and the loading of dunnage, cargo rigging sets, and the LARC-IX. The first cargo was accomplished using the ship's 120-ton booms which are designed to move very large objects and, hence, move rather slowly. Initially, the first day only containers and the LARC-IX were loaded before deckered-off operations. On most ships round-the-clock operations are possible but with the heavy-lift ship this is not advisable because of the extraordinarily long booms (100 ft) and the need for the boom operator to constantly watch the line passing through the sheaves at the boom tip. This is particularly true at night since artificial light at the 100-ft distance is inadequate.

The first lift on the second day was the 1466-class LC, which was loaded on the starboard side of Hold No. 4 without difficulty. The 9125 crane subsequently was loaded and stowed in the well deck of the LC. At hold No. 3 the 6250 crane was loaded on the port side and the sideloader on the starboard side. All lifts were made in a fairly routine fashion except for the 6250 crane which was lifted with a pronounced fore and aft tilt.

Off-loading began about 0730 on 4 November after the ship had moved to an anchorage off Blue Beach, Ft. Story. The order for off-loading was the 9125 crane, sideloader, the 40-ft container, the 9125 crane, the 1466-class LC, and the LARC-IX. Only the 6250 crane posed any difficulties and this was

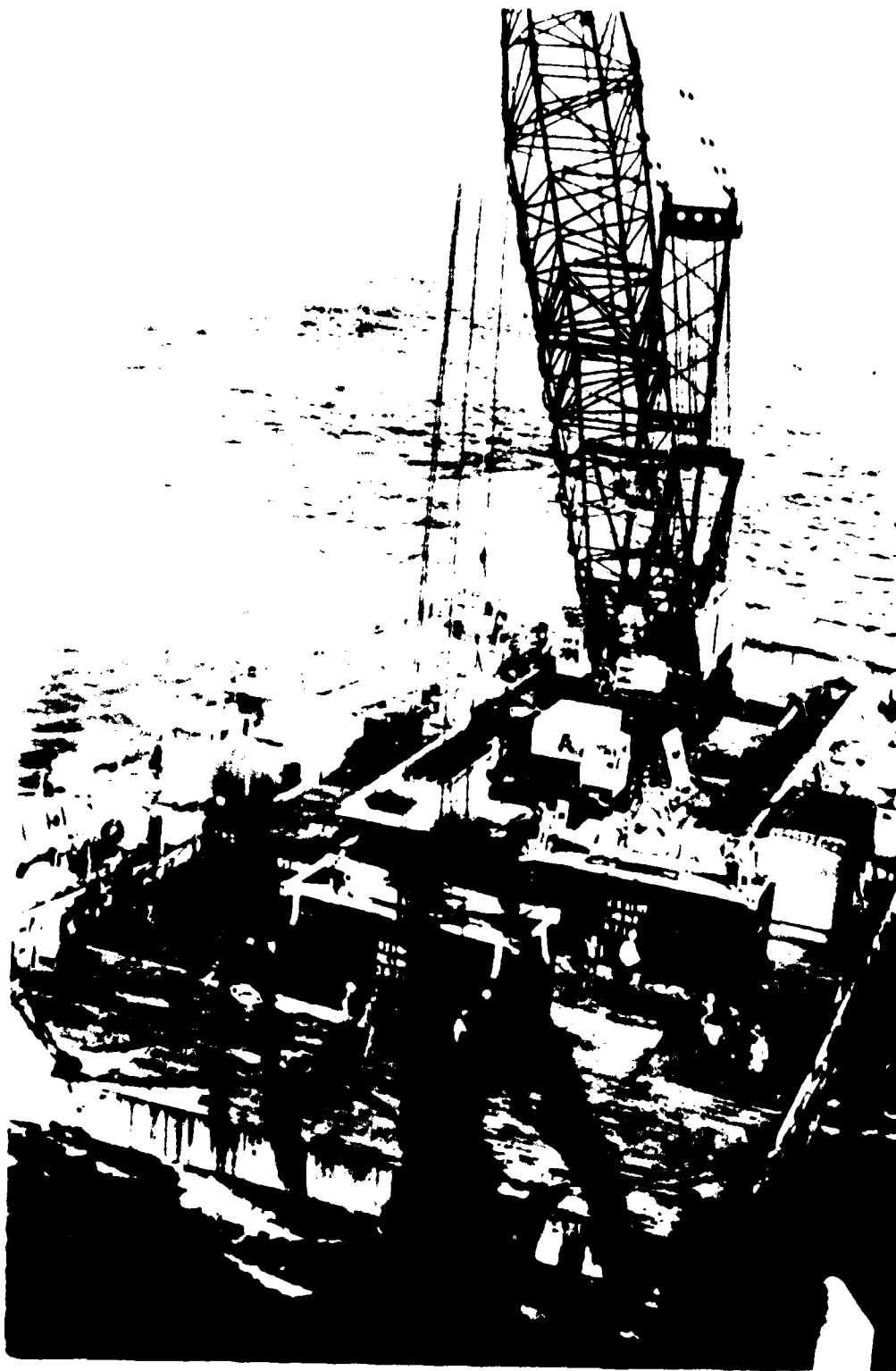


FIGURE 3. TEMPORARY CONTAINERSHIP DISCHARGE FACILITY





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FIGURE 5. ATTACHMENT POINTS TO ADJUST SPREADER BAR FOR CENTERS-
OF-GRAVITY ON 6050 AND 9115 TRUCKS

was successful, although there were minor delays in inserting the strap under the pins of the lifting frame and also in rehandling the loops of the strap over the cable ends of the ship's heavy-lift boom.

The smaller crane, the 9185, was lifted first. There was a delay while the crane upper was rotated 180 degrees. The boom base was over the crane truck cab in the final configuration. After a test lift the crane was set down again in the "L" and the nylon loop inspected. The lift was then made without any further delays.

The lift of the 6250 crane was the final heavy lift and was the only one that required an on-the-spot decision. The same lifting frame that was used for the smaller crane was used for the 110-ton 6250 crane lift. As the lift started, the load nosed up. The front wheels were about 3 ft off the deck before the rear wheels began to lift clear. The crane boom, facing the rear, slanted downward toward the ramp of the LCI it was being lifted from. If the lift had continued, the boom presumably would have come in contact with the top edge of the ramp. Experience in the breakbulk ship pretest¹ had shown that even seemingly minor bumps impacting on the tubular frame of the crane boom can cause dents that seriously affect the maximum lift capability of the crane. Thus the possibility of contact had to be minimized.

The way to avoid the problem would have been to re-rig the lift so that it remained level. This would have involved shifting the lift point at the apex of the lift frame from one point to another in the series of holes available. However, such re-rigging would have been time-consuming. A decision was made to continue the lift, but to first lower the LUL ramp so as to provide increased clearance. This was done, and the lift proceeded with the crane at a pronounced slant. As the crane started downward toward the deck of the ship the tilt would have caused the boom base to make contact with timbers on the hatch top before the crane wheels made contact. To avoid this possibility caused a delay of about 15 minutes. The crane was repositioned in such a way that the boom base was located over a gap between the framing of hatch number 1 and the deck house. This allowed the crane wheels to touch before the tip of the boom base. With that problem solved, the lift was completed.

The total time required for lift, including delays, was 2 hr and 12 minutes. There were three delays: 10 minutes waiting for the lift to tie-up in the proper position, 10 minutes for a crane control malfunction, and 15 minutes for the crane operator to get into the position. Following of this lift the ship would be in position to receive the lift.

1993-1994, 1995-1996, 1997-1998, 1999-2000, 2001-2002, 2003-2004, 2005-2006, 2007-2008, 2009-2010, 2011-2012, 2013-2014, 2015-2016, 2017-2018, 2019-2020, 2021-2022, 2023-2024, 2025-2026, 2027-2028, 2029-2030, 2031-2032, 2033-2034, 2035-2036, 2037-2038, 2039-2040, 2041-2042, 2043-2044, 2045-2046, 2047-2048, 2049-2050, 2051-2052, 2053-2054, 2055-2056, 2057-2058, 2059-2060, 2061-2062, 2063-2064, 2065-2066, 2067-2068, 2069-2070, 2071-2072, 2073-2074, 2075-2076, 2077-2078, 2079-2080, 2081-2082, 2083-2084, 2085-2086, 2087-2088, 2089-2090, 2091-2092, 2093-2094, 2095-2096, 2097-2098, 2099-2100, 2101-2102, 2103-2104, 2105-2106, 2107-2108, 2109-2110, 2111-2112, 2113-2114, 2115-2116, 2117-2118, 2119-2120, 2121-2122, 2123-2124, 2125-2126, 2127-2128, 2129-2130, 2131-2132, 2133-2134, 2135-2136, 2137-2138, 2139-2140, 2141-2142, 2143-2144, 2145-2146, 2147-2148, 2149-2150, 2151-2152, 2153-2154, 2155-2156, 2157-2158, 2159-2160, 2161-2162, 2163-2164, 2165-2166, 2167-2168, 2169-2170, 2171-2172, 2173-2174, 2175-2176, 2177-2178, 2179-2180, 2181-2182, 2183-2184, 2185-2186, 2187-2188, 2189-2190, 2191-2192, 2193-2194, 2195-2196, 2197-2198, 2199-2200, 2201-2202, 2203-2204, 2205-2206, 2207-2208, 2209-2210, 2211-2212, 2213-2214, 2215-2216, 2217-2218, 2219-2220, 2221-2222, 2223-2224, 2225-2226, 2227-2228, 2229-2230, 2231-2232, 2233-2234, 2235-2236, 2237-2238, 2239-2240, 2241-2242, 2243-2244, 2245-2246, 2247-2248, 2249-2250, 2251-2252, 2253-2254, 2255-2256, 2257-2258, 2259-2260, 2261-2262, 2263-2264, 2265-2266, 2267-2268, 2269-2270, 2271-2272, 2273-2274, 2275-2276, 2277-2278, 2279-2280, 2281-2282, 2283-2284, 2285-2286, 2287-2288, 2289-2290, 2291-2292, 2293-2294, 2295-2296, 2297-2298, 2299-2300, 2301-2302, 2303-2304, 2305-2306, 2307-2308, 2309-2310, 2311-2312, 2313-2314, 2315-2316, 2317-2318, 2319-2320, 2321-2322, 2323-2324, 2325-2326, 2327-2328, 2329-2330, 2331-2332, 2333-2334, 2335-2336, 2337-2338, 2339-2340, 2341-2342, 2343-2344, 2345-2346, 2347-2348, 2349-2350, 2351-2352, 2353-2354, 2355-2356, 2357-2358, 2359-2360, 2361-2362, 2363-2364, 2365-2366, 2367-2368, 2369-2370, 2371-2372, 2373-2374, 2375-2376, 2377-2378, 2379-2380, 2381-2382, 2383-2384, 2385-2386, 2387-2388, 2389-2390, 2391-2392, 2393-2394, 2395-2396, 2397-2398, 2399-2400, 2401-2402, 2403-2404, 2405-2406, 2407-2408, 2409-2410, 2411-2412, 2413-2414, 2415-2416, 2417-2418, 2419-2420, 2421-2422, 2423-2424, 2425-2426, 2427-2428, 2429-2430, 2431-2432, 2433-2434, 2435-2436, 2437-2438, 2439-2440, 2441-2442, 2443-2444, 2445-2446, 2447-2448, 2449-2450, 2451-2452, 2453-2454, 2455-2456, 2457-2458, 2459-2460, 2461-2462, 2463-2464, 2465-2466, 2467-2468, 2469-2470, 2471-2472, 2473-2474, 2475-2476, 2477-2478, 2479-2480, 2481-2482, 2483-2484, 2485-2486, 2487-2488, 2489-2490, 2491-2492, 2493-2494, 2495-2496, 2497-2498, 2499-2500, 2501-2502, 2503-2504, 2505-2506, 2507-2508, 2509-2510, 2511-2512, 2513-2514, 2515-2516, 2517-2518, 2519-2520, 2521-2522, 2523-2524, 2525-2526, 2527-2528, 2529-2530, 2531-2532, 2533-2534, 2535-2536, 2537-2538, 2539-2540, 2541-2542, 2543-2544, 2545-2546, 2547-2548, 2549-2550, 2551-2552, 2553-2554, 2555-2556, 2557-2558, 2559-2560, 2561-2562, 2563-2564, 2565-2566, 2567-2568, 2569-2570, 2571-2572, 2573-2574, 2575-2576, 2577-2578, 2579-2580, 2581-2582, 2583-2584, 2585-2586, 2587-2588, 2589-2590, 2591-2592, 2593-2594, 2595-2596, 2597-2598, 2599-2600, 2601-2602, 2603-2604, 2605-2606, 2607-2608, 2609-2610, 2611-2612, 2613-2614, 2615-2616, 2617-2618, 2619-2620, 2621-2622, 2623-2624, 2625-2626, 2627-2628, 2629-2630, 2631-2632, 2633-2634, 2635-2636, 2637-2638, 2639-2640, 2641-2642, 2643-2644, 2645-2646, 2647-2648, 2649-2650, 2651-2652, 2653-2654, 2655-2656, 2657-2658, 2659-2660, 2661-2662, 2663-2664, 2665-2666, 2667-2668, 2669-2670, 2671-2672, 2673-2674, 2675-2676, 2677-2678, 2679-2680, 2681-2682, 2683-2684, 2685-2686, 2687-2688, 2689-2690, 2691-2692, 2693-2694, 2695-2696, 2697-2698, 2699-2700, 2701-2702, 2703-2704, 2705-2706, 2707-2708, 2709-2710, 2711-2712, 2713-2714, 2715-2716, 2717-2718, 2719-2720, 2721-2722, 2723-2724, 2725-2726, 2727-2728, 2729-2730, 2731-2732, 2733-2734, 2735-2736, 27

1960-1961

44. Beginning on the 10th, the weather began at about 15°; November 4. The weather was fair and clear, and the wind was light. For the most part the order

Operational Research, Inc., report, "Results of the Conventional Breakbulk Ship Pretest of the Joint Military Over-the-Horizon (JMH) Test and Evaluation Program," TR-70-10, Report No. 70-10, October 1970.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84

[illegible][illegible]

The majority of the time spent on the beach with the crane is in the removal of the *huron*, *intermarcescens*, *perdrill*, and *st-rapper* fish, and removing the wire components that are a result of a completed fishing season. Commercial and military parties that are called about half as frequently to turn the crane around so that the crane could operate over the rear of the same barrier where its lifting capability would be greater than over the track. On a break with the time required to make the crane ready to operate is 10 minutes.

TABLE 1

Summary of the results of the investigation of the effect of the concentration of the solution on the rate of the reaction

Concentration of the solution, g/l.

Rate of the reaction, g/l.

Time, min.

Temperature, °C.

0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

1.0

1.1

1.2

1.3

1.4

1.5

1.6

1.7

1.8

1.9

2.0

2.1

2.2

2.3

2.4

2.5

2.6

2.7

2.8

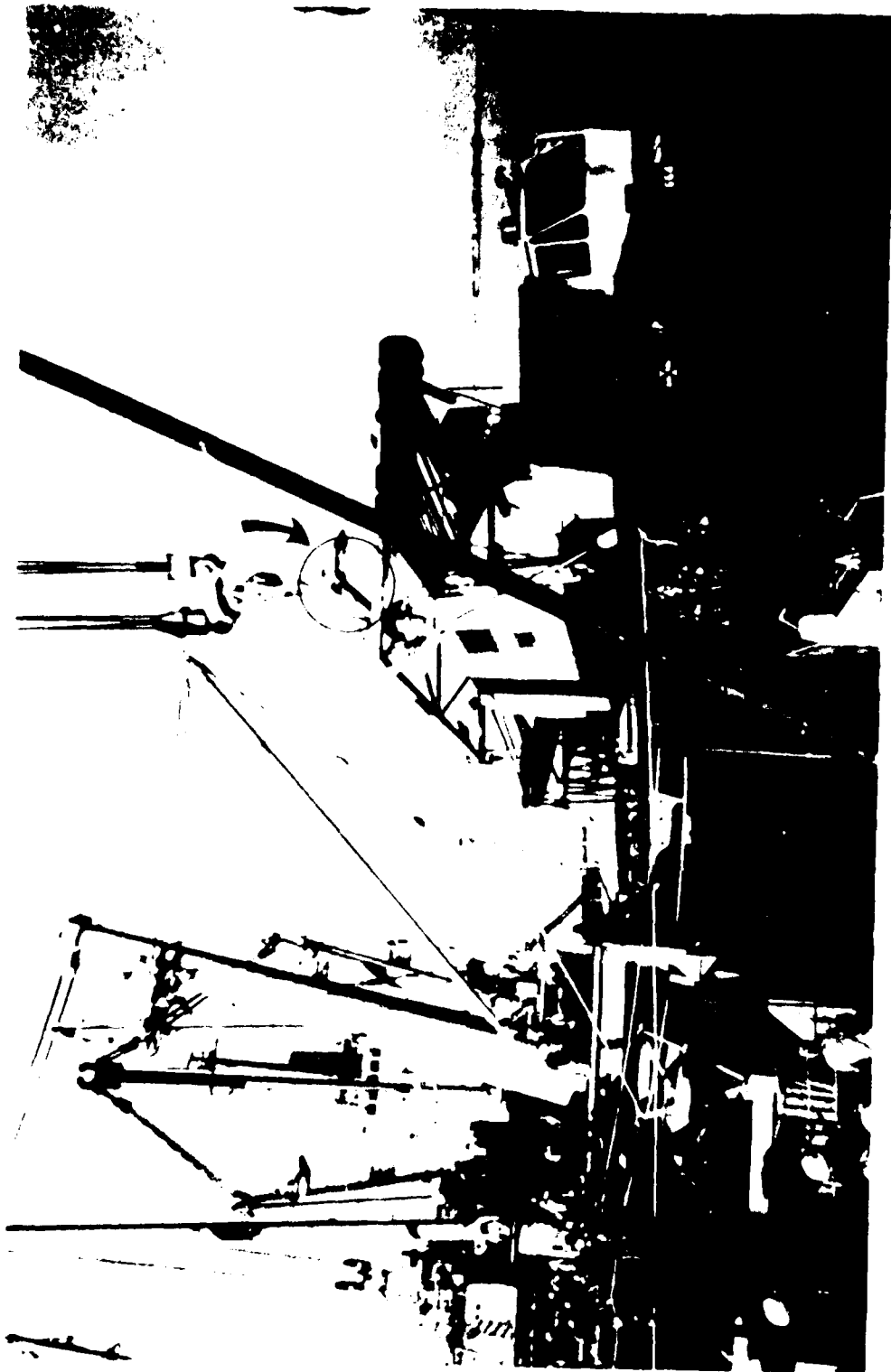
2.9

3.0

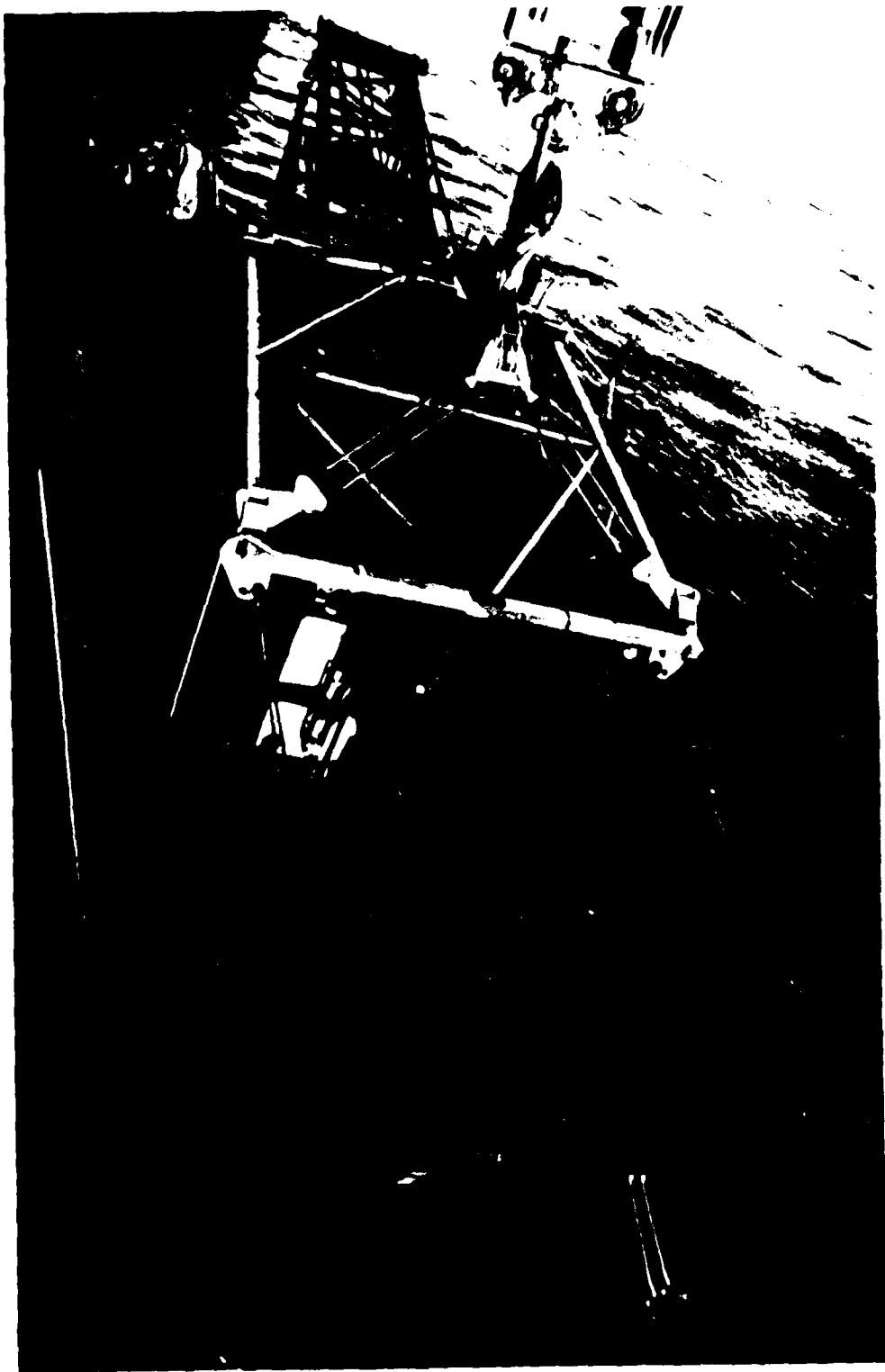
3.1

3.2

3.3



1. The ship's deck, showing various equipment and a person standing near the center.



SHIP'S CRANE BEING LANDED IN L.H. WITH RAMP DOWN

10

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-

... ..

9125 Crane

The LCM8 carrying the Army 9125 crane to shore had no difficulty underway despite a pronounced list. The LCM8 grounded on an off-shore sandbar an hour before low tide. A LARC-V from the Naval Beach Group detachment assisted it in backing off. The LCM8 then waited for the tide to come in, and some 6 hr later made a second attempt. Again the LCM8 was stuck on a sandbar. This time cables were passed from bulldozers to the landing craft. With a hard strain on the lines the LCM8 was pulled over the bar and into the deeper water nearer the shore. From there it was successfully beached.

Bulldozers then graded a ramp for the crane to use in coming ashore. Momat was unrolled onto the graded ramp and, some 30 minutes after the LCM8 had been pulled across the sandbar, the crane was ready for moving ashore. In moving out of the LCM8 onto the mat, the crane got hung up on the after end of its carrier. By using an outrigger to jack itself up, the crane freed itself and moved onto the beach with no further difficulty. No difficulty was recorded in assembling the crane's counterweights, attaching the boom sections, and reeving the cables. These operations were accomplished during the night so that the crane was ready for operations before the first landing craft arrived the next day.

Sideloader

The LCU carrying the sideloader also had to be assisted by bulldozers in landing. It came ashore on the same tide as the LCM8 carrying the 9125 crane. After moving ashore out of the LCU, the sideloader overran the Momat matting and got stuck in the sand. Bulldozers assisted and got it back on the Momat. On another occasion it got stuck crossing a narrow gap between Momat strips. This time it used its outriggers to elevate its tires so that beach matting could be placed under them and then it was freed.

CONTAINER THROUGHPUT OPERATIONS

General

In the second phase of the pretest, which involved container throughput operations, the TCCF was used exclusively to discharge containers from hold and deck stowage locations aboard the TRANSCOLUMBIA to various types of lighters, including LCU, LCM8, LARC-XV, LARC-LX, BC barge, and causeway ferry.

Four methods were used to unload containers from lighters:

- 140-ton crane on jacked-up B DeLong to off-load all lighters and load containers on milvan chassis.
- 300-ton crane at the high waterline primarily to off-load LCU and LCM8 craft. It was used to also off-load amphibians and to transfer loaded containers onto milvan chassis.
- 140-ton crane in the marshalling area to unload amphibians.

- Frontloader to off-load containers from a causeway ferry onto milvan chassis.

These subsystem elements were not used concurrently due to the small quantity of test cargo available (20 milvans and 1 40-ft van). Nevertheless, the pretest was the first opportunity in 4 years that a container throughput exercise had been attempted. Data and training on the new Army equipment were needed. It was also the first time in 4 years that a container marshalling area operation was conducted and, although the activities there were relatively slow and simple, the same data and training opportunities existed. Documentation and movements management also played a part in this phase with some limited use of the mobile GPS van.

To be representative of military cargo shipped in containers, the containers were weighted with dummy cargo. Figure 2 shows the weight distribution of the containers used.

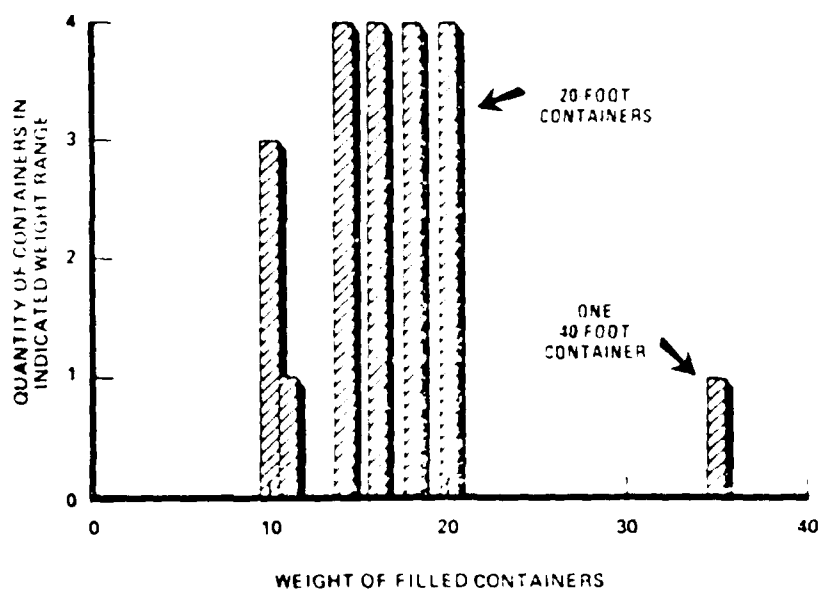


FIGURE 2. DISTRIBUTION OF CONTAINER WEIGHTS (20 and 40-FT)

Temporary Container Discharge Facility

Use of the heavy-lift breakbulk ship as a containership had two of recognized drawbacks. First, there were no cell guides to assist in attachment of the container spreader bar to containers in the hold. As a result, stevedores had to wrestle the spreader bar around over the tops of containers until it could be engaged with the corner fittings. Second, the TDCF had to

make allowances for clear the ship's booms and kingposts. Both of these obstacles tended to slow cycle times. However, the time data gathered provides some magnitude information useful for main test planning.

During the pretest the containers were first completely off-loaded from the ship and retriaged. In some cases a container was backloaded and then without detaching the containers from the spreader bar the container was reloaded in the lighter. These latter iterations were disregarded since they had more training value than data validity. The TCOF working the TRANS-LOG MBI4 off-loaded 32 and backloaded 16 containers. When the ship charter period was completed, a LASH barge was used briefly instead. No timings were made of these loading and unloading events. There were considerable periods while working the ship in which the crane was inactive or delayed. When the TCOF had landed and was operating, a cycle required approximately 10 minutes. Similarly, backloading containers to the ship required approximately 7 minutes each. Further discussion on these times is contained in Section III. Table 6 summarizes the statistics of the TCOF.

TABLE 6
SUMMARY OF TCOF CHARACTERISTICS

| | |
|---|------------------|
| TCOF length (boom assembled) | 130 ft |
| TCOF width | 60 ft |
| TCOF weight* | 656.2 LTons |
| boom length | 100 ft |
| boom tip used | Heavy duty |
| weight of hook blocks (2) | 1,450 lb each |
| hook operation | Double drum |
| wire | 1 inch |
| number of parts per hook | 2 parts per hook |
| TCOF actual operation during test | 15.3 |
| * includes barge, crane, and crane foundations. | |

Crane or Barge?

Operations with the 6250 crane at the water's edge commenced the afternoon of 2 November. The first day's activities consisted of discharging only five LASHs during a period of approximately 1 1/2 hr. Operations had commenced just 45 minutes after low tide, so it was not possible to land LCUs, LVTs, or barges close enough for the crane to reach them. Therefore, to attain some crane use, amphibians were employed instead.

The next day, there was a morning high tide (0854) so retrograde operations were possible. One L¹ was beached, backloaded with four containers, and retracted in 4 minutes. The average cycle time per container was 16 minutes 4 seconds. Bad weather was being experienced at the beach so the next day was loaded with only two containers before it was retracted after 22 minutes. After that the L² crane practiced loading and unloading LARC-1's and trucks. Winds at 10-18 knots were experienced which caused difficulties for tagline handlers.

On the last day of beach operations for the 11-ton crane, approximately 1 hr before high tide, a LASH barge was grounded within the channel's reach and four containers were unloaded at an average rate of 8 3/4 minutes each. The barge was subsequently brought in at low tide and one container was off-loaded.

Beach Unloading Pier

The general beach unloading system to be exercised was the 11-ton crane on the Delong pier. The Delong with the crane abait was towed to the objective area by tugs and positioned at the beach using a MoB. Installation began 1 November. Working schedules normally followed a 0700-1600 routine once the Delong was in.

The Delong was brought in approximately 1 hr before high tide and approximately 4 minutes later all its caissons (piling) had been lowered. There was no activity the next day and the third day, 2 November, after some weather set in, the ramps to the Delong were lowered from the Delong to the beach. However, by the end of that day some additional alignment was required and the fourth day was spent aligning the ramps. Then, because a gap existed shoreward of the 4-ft high Delong ramps, an assault vehicle landing ramp (A41) was installed. By the end of the day, after approximately 10 hr of activity, spread over 4 days, the Delong pier was ready for operations. Appendix I provides a detailed description of the installation process and subsequent crane operations.

Operationally the Delong handled approximately 10 containers during the activity phase. The first day of operations was mostly one of practice loading and off-loading craft and once onto a truck. The morning of the next day, 4 November, the hydraulic spreader was found damaged and a manual spreader had to be obtained. Consequently, the opportunity for operations during the high tide period was lost. During the low tide period initially some practice was accomplished by loading and off-loading trucks. Then two LARC-1's were sent with containers to the Delong and these were unloaded onto the pier. One container was later retrograded via a LARC-1.

The next day, 5 November, was more active. In the morning during high tide two L¹'s were loaded with three retrograde containers. Then three L²'s and a L³ barge were moored for off-loading a total of 10 containers. In the afternoon installations replaced landing craft in order that operations could continue during low tide. Two LARC-1's were off-loaded and two others were backloaded.

[illegible]

The last day, 7 November, a LAHR barge was moved at high tide to the scene and loaded with four containers. At some point the LAHR barge was damaged and required welding a plate over the hole. The welding was done at low tide with the barge grounded and the hole exposed.

... ..

The causeway ferry was used twice during the operation. The first time was during the loading in which containers were placed on military chassis directly on the ferry. The second employment a day later called for placing the military equipment on the causeway. The four-section causeway used in both instances was loaded with two LCM6 causeway tender boats.

At 1400 hours, the first operation was begun by loading three milvan trailers at the beach east of the Helong pier. Bulldozers constructed a sand ramp to the causeway. As soon as the ramp was prepared, three M-54 trucks with the trailers individually proceeded onto the causeway. Each truck-trailer unit was positioned in a separate causeway section. The most seaward section, the one between the two tender boats, was left vacant. None of the vehicles were damaged. The causeway retracted from the beach without difficulty at 1430 hours and proceeded towards the ship.

At 14:00 the first cylinder was lifted from the deck of the TUG. After attempting to move to position the container on the platform trailer, the attempt was aborted. The problems were:

- The relative motions of the ICC and the causeway.
- The twist angle (approximately 45 degrees) needed to properly align the container with the trailer (see Figure 3).
- The limited deck area for line holders.
- The target is small—even when there is no relative motion, as on dry land; it is not easy to position a container directly onto the container fittings of this type of trailer without repeated tries.

The second attempt on a different trailer was successful, requiring about 10 minutes. The first lift attempted had been to a trailer spotted on the runway well forward of the lift crane. The second lift loaded a trailer which offered a better angle to the axis of the boom. (Dotted lines, Figure 9.) The

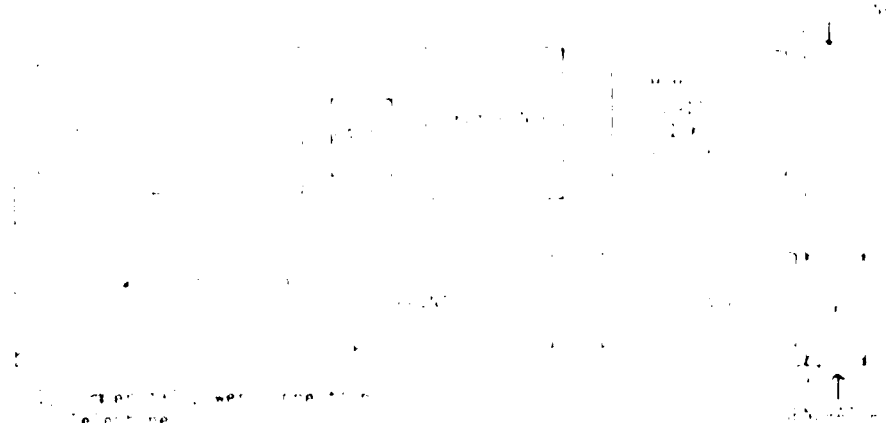


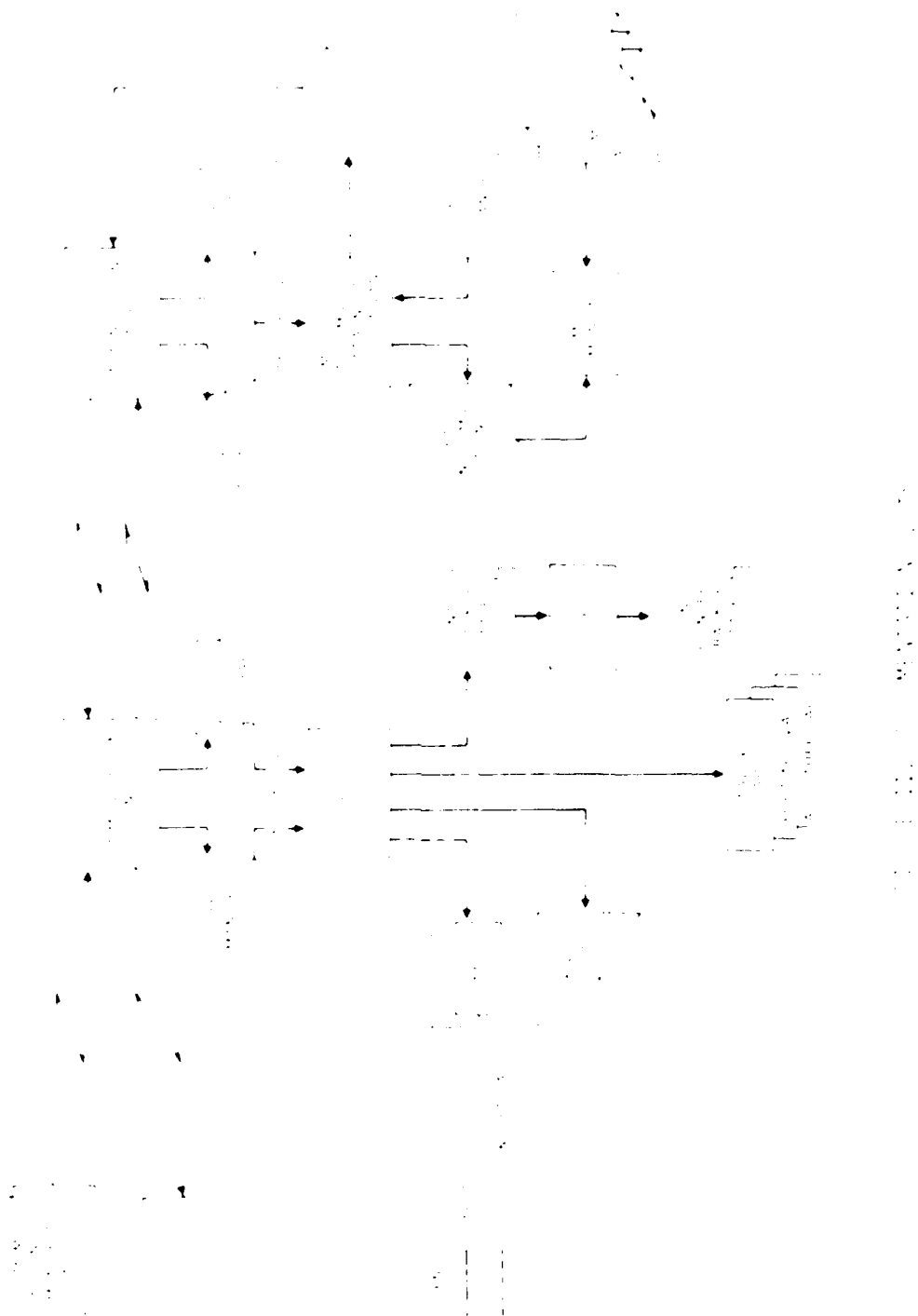
Figure 1. Schematic diagram of the data processing system.

The data processing and receipt of information by the system was not played into the system. The data was processed by punched cards were used to enter the data into the system. The data was then processed by the discharge faller in the back and then sent to the data var for processing. With the installation of the system, it was possible to prepare cards that were later processed by the system to provide reports on the data entered at the test.

The data processing system was designed to process data from the data var, which included tallies from several tests of the test and the handling area. The data processing was designed to process data from the data var, which included tallies from several tests of the test and the handling area. The data processing was designed to process data from the data var, which included tallies from several tests of the test and the handling area. The data processing was designed to process data from the data var, which included tallies from several tests of the test and the handling area.

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[illegible]

1. *Phragmites australis* (Cav.) Trin. ex Steud.

[illegible]

This position proved to be in error--the pins should have been at the other end. As the lift began the error became all too evident. The center of gravity of the crane assembly began to swing to a position under the suspension point, with the crane at a strong tilt. (See sketch, Figure 12.)

The tilt, however, was accommodated in the loading phase, although it did create some delay. While the ship was underway or prior to the initiation of ship unloading, the lifting frame should have been modified. The decision not to correct the location of the pins resulted in additional delays during off-loading operations.

Comparison of Crane Readiness Times for Different Assembly Configurations

The disassembly of the 300-ton capacity crane to a tactical configuration for deployment takes less time than an administrative (detailed) disassembly would for deployment on a ship with a less capable boom. This, of course, is also true for crane reassembly once the crane has been shipped to the objective area. Table 7 illustrates the differences in deployment times for the two disassembly operations. The table is based upon judgments regarding which delays are typical of real operations, which operations can be done concurrently, and the like.

In the test the 6250 crane was made ready from its minimum disassembly configuration in a shorter period than required when fully disassembled as in previous pretests. The turnaround of the crane on the beach makes a precise comparison of the times for the two get-ready operations difficult. Even after subtracting administrative delays, it is not possible to make an exact comparison.

The comparison shown in Table 7, then, should be interpreted as showing a general order of magnitude of difference in the times that could be expected between the two assembly operations, if two otherwise similar operations are compared. The table indicates what times were included and excluded in the comparison.

Looked at in total, the savings in time by moving the crane in its minimum disassembly configuration is about 2 days. This difference depends on the assumptions made. These assumptions concern such matters as:

- Whether the loading bottleneck will be the heavy crane (in effect, Table 7 does assume this);
- The order of unloading from the ship (the components for the 9125 and 6250 cranes are assumed to have priority for unloading); and
- Whether the assembly of the 9125 crane could be done concurrently with the discharge of the 6250 crane components from the ship (as assumed in Table 7).

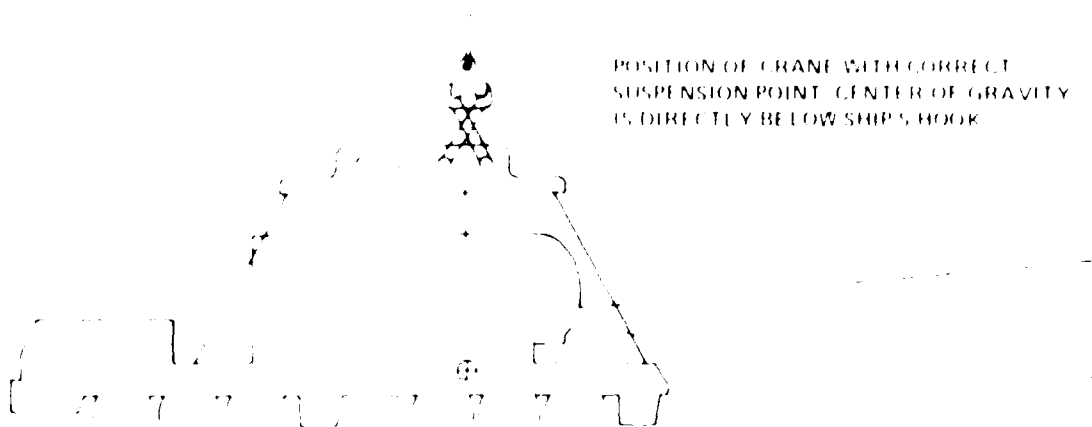


FIGURE 1.1. SCHEMATIC SHOWING CRANE TILT
Tilt resulted from incorrect selection of holes
in top member of hoist rig.
(Not to scale.)

TABLE 1
APPROXIMATE TIMES FOR DEPLOYING HEAVY CRANE

| Administrative, Disassembled (250
(as in previous pretest)) | | Minimum Disassembly
(as in Heavy-Lift Ship pretest) | |
|--|---------|--|---------|
| Disassembly and Loading Times | | | |
| Disassembly and mobile loading
(as reported in 411-43) | 40 hr | Partial disassembly and mobile
loading of booms and ctrwts. | 11 hr |
| Transit time to port
not counted | — | Transit time | — |
| Loading times: counterweights,
booms, etc. (11 lifts) | 22 hr | Single heavy lift | 1 hr |
| Loading times: counterweights,
booms, etc. (11 lifts) | 22 hr | Counterweights, booms, etc. | 2.2 hr |
| | 62.4 hr | | 16.2 hr |
| Off-loading times (at objective area) | | | |
| Off-loading needed to assist
disassembly, etc. | 1.5 hr | Off-loading assembled crane | 1.5 hr |
| Transfer | 1.5 hr | | — |
| Store | 1.5 hr | | — |
| Monitor total off-loading | 4.5 hr | | 4.5 hr |
| Movement to shore | | | |
| Transit time to last float;
free transit time would be
reduced with off-loading | 1.0 hr | Ship-to-shore transit time | 1.0 hr |
| Transfer time at shoreline,
time to, to last float;
free time would be reduced
with off-loading | 1.0 hr | Transfer time | 1.0 hr |
| | 2.0 hr | | 2.0 hr |
| Assembly times (based on best estimates) | | | |
| Reassemble 9175 crane | 13 hr | Install operator's module | 1 hr |
| Reassemble 6250 crane | 20 hr | Assemble booms and counter-
weights | 3 hr |
| | 33 hr | | 4 hr |
| | 64.4 hr | | 21.7 hr |
| Difference attributable to degree of disassembly, 11.7 hr | | | |

Even if the assumptions listed are not realized in a contingency and the listed components of the deployment times are different from those shown in the table, it is judged that there would still be a definite advantage. This advantage would be in the order of two days if the more fully assembled crane configuration is possible for deployment. This advantage is gained by the use of a heavy-lift ship that can load and discharge the crane (tactically disassembled) and the type lighter needed to transport the 6250 crane (in its more nearly operational configuration) to shore.

The decision on which configuration to use in moving the 6250 crane will be dictated by the shipping available. Assuming that in a future emergency heavy-lift ships will have other cargo competing for sea transport, a comparison like that shown above would be of value in making a decision on shipping allocations. Furthermore, if necessary, shipments must be delayed until an appropriate estimate of the impact capability has been established in the objective area.

One of the major allocation considerations are the lesser risks in the movement of the relatively fully assembled crane versus the risks of reassembly. The latter has been detail-stripped. Detail stripping is necessary to permit the crane being carried on a ship that can load and off-load components weighing only a few tons or less. The detailed disassembly and reassembly requires the need for more highly skilled and experienced personnel and still leaves the risk of not being able to assemble those fitting components that might have been damaged in transit.

Moving Cranes Ashore from Ship

Transit of the cranes from the ship to the vicinity of the beach (from their respective lighters, the LCU and the LCMs) presented no problem. But landings close to the beach presented real difficulties at low tide and considerable even at high tide. Thus, the sandbars were a considerably deterring factor in landing in the operations at Green Beach, Ft. Story. For the amphibious operations amphibians are, of course, an answer to sandbars and the beach gradient problems. However, during the deployment phase and ship-to-shore movement, even the largest amphibious vehicle (the LARC-11) is not capable of lightering either crane. In any case, these vehicles are in short supply and are themselves difficult to deploy. Thus, for deployment with landing craft, beach gradient and sandbar problems appear to need further study, in the light of the potential problems they present to equipment deployment, especially LVT equipment.

LCU, LCM, and LARC-11

The use of the heavy-lift ship to deploy 14ft-class LCUs was reaffirmed as a tried and proven procedure during the pretest. However, the Navy's new 1646-class LCU which had been scheduled for loading was not because neither the ship nor the Navy had the necessary sling. As part of the charter agreement the ship is required to carry other LCU slings but no requirement has been levied for carrying a sling needed for this type landing craft. Since this is the predominant LCU in the Navy and the older Army LCUs will be phased out in favor of a craft similar to the Navy's, this shortcoming should be rectified.

From the point of view of the best use of the heavy-lift ship as a resource with severe limitations on the total quantities of equipment it can carry, its lift capability is still most important. MCR has 16 ships that can carry LMs, causeway sections, and, potentially, BC barges, but it has only these two ships that can carry four LFs each. An LF is necessary for carrying a fully-assembled crane and it has a greater container lightering capacity that is relatively unhindered in improved beach operations. It also has capabilities to operate longer in heavy weather than other types of landing craft.

CAUSEWAY FERRY BEACHING

The causeway ferry was the only non-amphibian lighter in the pretest that was able to function at any desired stage of the tide and could cross sandbars that hindered other landing craft. The reason for this is the shallow draft of the causeway, particularly its shoreward end when left unloaded. The shallow draft permits a close approach to the beach and its light weight forward permits the shore end to be pushed up on the sand toward dry land. The section at the shore end is, thus, literally a causeway leading out to the cargo-carrying sections of the ferry which remain in deeper water. The total length of the four-section ferry used was 460 ft, although additional sections can be added increasing the length.

The operation in which the causeway was loaded with containers placed with their long ends athwartship was in the overall more efficient than the operation in which the containers were placed on milvan chassis. This was because much greater accuracy was required to land the containers on the milvan chassis, which proved to be difficult and time consuming.

For the operation without trailers the containers were placed directly on the causeway. One possible disadvantage is that loaded in this manner there is a greater chance the containers are likely to get wet in other than a calm sea. Also, the containers had to be positioned athwartship for unloading by a frontloader on the beach. This required tagline handlers to turn the suspended containers 90 degrees or more. This was accomplished, however, without great difficulty. Since the containers are 16 ft long and the causeway is 21 ft wide, there is little room along the edge of the causeway for tagline handlers to maneuver the swaying containers.

For unloading the ferry on shore the frontloader was very effective. Since only one unit was slow since the same frontloader was also used to position each container on a trailer. The five containers were unloaded in just over 1 hr, or approximately 68 minutes each. If two front loaders had been available this time could have been greatly reduced. An empty loader could move onto the causeway immediately after its predecessor left with a load. Another way to reduce the causeway unloading time, at the expense of some double handling and possible truck delay, would be to have the single frontloader drop each container at a point near the causeway until it was unloaded. Then the frontloader would load trailers until another loaded causeway ferry was beached.

The causeway ferry provides a beaching capability where landing craft are not able to function. Its use should be considered by the JIC in its lighterage mix during periods of the main test when landing craft are unable to beach.



On 12/19/2011, the FBI received information from a confidential source that the FBI was being contacted by an individual who was claiming to be a member of the FBI and was offering to provide information regarding the activities of the FBI. The individual claimed to be a member of the FBI and was offering to provide information regarding the activities of the FBI. The individual claimed to be a member of the FBI and was offering to provide information regarding the activities of the FBI.

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the 1990s, the number of people in the world who are illiterate has increased from 400 million to 600 million. The number of illiterate people in the world is expected to reach 700 million by the year 2015. The number of illiterate people in the world is expected to reach 800 million by the year 2020. The number of illiterate people in the world is expected to reach 900 million by the year 2025. The number of illiterate people in the world is expected to reach 1 billion by the year 2030. The number of illiterate people in the world is expected to reach 1.1 billion by the year 2035. The number of illiterate people in the world is expected to reach 1.2 billion by the year 2040. The number of illiterate people in the world is expected to reach 1.3 billion by the year 2045. The number of illiterate people in the world is expected to reach 1.4 billion by the year 2050. The number of illiterate people in the world is expected to reach 1.5 billion by the year 2055. The number of illiterate people in the world is expected to reach 1.6 billion by the year 2060. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2065. The number of illiterate people in the world is expected to reach 1.8 billion by the year 2070. The number of illiterate people in the world is expected to reach 1.9 billion by the year 2075. The number of illiterate people in the world is expected to reach 2 billion by the year 2080. The number of illiterate people in the world is expected to reach 2.1 billion by the year 2085. The number of illiterate people in the world is expected to reach 2.2 billion by the year 2090. The number of illiterate people in the world is expected to reach 2.3 billion by the year 2095. The number of illiterate people in the world is expected to reach 2.4 billion by the year 2100.

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The first of these is the *Journal of the American Medical Association* (JAMA), which has been the most influential of the medical journals in the United States. It was founded in 1883 and has since then published a wide range of medical research, including clinical trials, case reports, and reviews. The JAMA has been a leading voice in the medical community, and its publications have been widely cited in the literature.

The second of these is the *New England Journal of Medicine* (NEJM), which was founded in 1812 and has since then published a wide range of medical research, including clinical trials, case reports, and reviews. The NEJM has been a leading voice in the medical community, and its publications have been widely cited in the literature.

The third of these is the *Lancet*, which was founded in 1823 and has since then published a wide range of medical research, including clinical trials, case reports, and reviews. The Lancet has been a leading voice in the medical community, and its publications have been widely cited in the literature.

The fourth of these is the *British Medical Journal* (BMJ), which was founded in 1847 and has since then published a wide range of medical research, including clinical trials, case reports, and reviews. The BMJ has been a leading voice in the medical community, and its publications have been widely cited in the literature.

The fifth of these is the *Medical Research Service* (MRS), which was founded in 1946 and has since then published a wide range of medical research, including clinical trials, case reports, and reviews. The MRS has been a leading voice in the medical community, and its publications have been widely cited in the literature.

The sixth of these is the *Journal of the Royal Society of Medicine* (JRM), which was founded in 1911 and has since then published a wide range of medical research, including clinical trials, case reports, and reviews. The JRM has been a leading voice in the medical community, and its publications have been widely cited in the literature.

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the 1990s, the number of people in the world who are under 15 years of age is expected to increase by 1.5 billion, from 1.1 billion in 1990 to 2.6 billion in 2010. The number of people aged 65 and over is expected to increase by 1.1 billion, from 350 million in 1990 to 1.4 billion in 2010. The number of people aged 15-64 is expected to increase by 1.5 billion, from 2.5 billion in 1990 to 4.0 billion in 2010. The number of people aged 65 and over is expected to increase by 1.1 billion, from 350 million in 1990 to 1.4 billion in 2010. The number of people aged 15-64 is expected to increase by 1.5 billion, from 2.5 billion in 1990 to 4.0 billion in 2010.

the fact that the two groups of subjects were not matched for age, which could have influenced the results. The authors also note that the study was not a true experiment, as the subjects were not randomly assigned to the two groups. However, the authors argue that the results are still valid, as the two groups were matched for all other variables, and the results were consistent across the two groups. The authors also note that the study was limited by the small sample size, and that the results may not be generalizable to other populations. However, the authors argue that the results are still valid, as the study was well-controlled and the results were consistent across the two groups.

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THE EFFECTS OF THE 1964-65 DROUGHT

The effects of the drought on the 1964-65 season were extremely severe, and the effects on the 1965-66 season were also very serious. The effects on the 1964-65 season were as follows: (1) The 1964-65 season was the driest in the history of the area, with only two inches of rain falling in the entire season. (2) The 1964-65 season was the hottest in the history of the area, with the temperature reaching 110 degrees Fahrenheit in the shade. (3) The 1964-65 season was the most destructive in the history of the area, with the drought causing the death of many animals and the destruction of many crops. (4) The 1964-65 season was the most costly in the history of the area, with the drought causing the loss of many thousands of dollars. (5) The 1964-65 season was the most painful in the history of the area, with the drought causing the suffering of many thousands of people. The effects on the 1965-66 season were also very serious. The 1965-66 season was the second driest in the history of the area, with only three inches of rain falling in the entire season. The 1965-66 season was also the second hottest in the history of the area, with the temperature reaching 110 degrees Fahrenheit in the shade. The 1965-66 season was also the second most destructive in the history of the area, with the drought causing the death of many animals and the destruction of many crops. The 1965-66 season was also the second most costly in the history of the area, with the drought causing the loss of many thousands of dollars. The 1965-66 season was also the second most painful in the history of the area, with the drought causing the suffering of many thousands of people. The effects of the drought on the 1964-65 season were as follows: (1) The 1964-65 season was the driest in the history of the area, with only two inches of rain falling in the entire season. (2) The 1964-65 season was the hottest in the history of the area, with the temperature reaching 110 degrees Fahrenheit in the shade. (3) The 1964-65 season was the most destructive in the history of the area, with the drought causing the death of many animals and the destruction of many crops. (4) The 1964-65 season was the most costly in the history of the area, with the drought causing the loss of many thousands of dollars. (5) The 1964-65 season was the most painful in the history of the area, with the drought causing the suffering of many thousands of people. The effects on the 1965-66 season were also very serious. The 1965-66 season was the second driest in the history of the area, with only three inches of rain falling in the entire season. The 1965-66 season was also the second hottest in the history of the area, with the temperature reaching 110 degrees Fahrenheit in the shade. The 1965-66 season was also the second most destructive in the history of the area, with the drought causing the death of many animals and the destruction of many crops. The 1965-66 season was also the second most costly in the history of the area, with the drought causing the loss of many thousands of dollars. The 1965-66 season was also the second most painful in the history of the area, with the drought causing the suffering of many thousands of people.

1. The first part of the report deals with the general situation of the country and the position of the various groups. It is a very good summary of the situation and is well written.

2. The second part of the report deals with the economic situation of the country. It is a very good summary of the situation and is well written.

3. The third part of the report deals with the social situation of the country. It is a very good summary of the situation and is well written.

4. The fourth part of the report deals with the political situation of the country. It is a very good summary of the situation and is well written.

5. The fifth part of the report deals with the cultural situation of the country. It is a very good summary of the situation and is well written.

6. The sixth part of the report deals with the educational situation of the country. It is a very good summary of the situation and is well written.

7. The seventh part of the report deals with the health situation of the country. It is a very good summary of the situation and is well written.

8. The eighth part of the report deals with the housing situation of the country. It is a very good summary of the situation and is well written.

9. The ninth part of the report deals with the transportation situation of the country. It is a very good summary of the situation and is well written.

10. The tenth part of the report deals with the communication situation of the country. It is a very good summary of the situation and is well written.

11. The eleventh part of the report deals with the energy situation of the country. It is a very good summary of the situation and is well written.

12. The twelfth part of the report deals with the environment situation of the country. It is a very good summary of the situation and is well written.

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TABLE A-1
SUPPLEMENTAL DATA

| Deck heights | |
|-------------------------------|---------------------|
| Height of deck and upper deck | 10 ft 6 in. (3.2 m) |
| Deck deck | 10 ft 6 in. (3.2 m) |
| Deck height | 10 ft 6 in. (3.2 m) |
| Deck height | 10 ft 6 in. (3.2 m) |
| Deck height | 10 ft 6 in. (3.2 m) |
| Deck height | 10 ft 6 in. (3.2 m) |

| Deck heights | | | | | |
|--------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Deck | Deck height | Deck height | Deck height | Deck height | Deck height |
| Deck height | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) |
| Deck height | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) | 10 ft 6 in. (3.2 m) |

Maximum height of deck (ft) 10 ft 6 in. (3.2 m)
 Maximum height of deck (ft) 10 ft 6 in. (3.2 m)
 Maximum height of deck (ft) 10 ft 6 in. (3.2 m)
 Maximum height of deck (ft) 10 ft 6 in. (3.2 m)

the 1990s, the number of people in the world who are under 15 years of age is expected to increase from 1.1 billion to 1.5 billion. The number of people aged 65 and over is expected to increase from 200 million to 400 million. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion.

[illegible]

- one 700 cc generator for the A.D.C. crane
- one 100 cc generator
- two fuel tanks, one for air compressor, the other a generator
- assorted lifting equipment
- two gas welder tanks (acetylene & oxygen)

{ 1 - 1 }



FIGURE B.1.1. B OELONG PIER ENROUTE TO RED BEACH

After a day with no activity (November 2), work began on positioning the ramps. "Ball-bearing steel" plating, mounted on rail-ties, was positioned in front of the barge on the beach to act as a foundation for the beach end of the ramp when the ramp had been winched off the barge. Concurrently, a metal lip at the shore edge of the large was burned off with an acetylene torch to facilitate off-loading the ramp. Holes were cut in the ramps for cable hooks so that each ramp could be winched off with two bulldozers.

During the operation the bulldozer winched a little faster than the other, causing some side motion of the first ramp. As a result, the cable hole on the right side was distorted and the line came loose. A new hook-up was made to an existing clewline and the ramp was winched off the barge without further incident. The ramp was pulled to a position with one end on the pier and the other still overlapping the barge platform by approximately 15 ft.

The beach area was again graded and the beach end foundation timbers were realigned. The second ramp was winched off the barge. Alignment with the left ramp was assisted by an additional bulldozer. The winching this time took only 45 minutes. (Lessons learned in the first ramp were evident during the winching operation on the second.)

Next the pier was raised further on its caissons to allow a better angle for the ramps to the pier support beams. The supports, or ledges, are located on the vertical face of the barge end. They are at a sufficient distance below the barge deck so that when the ramps are in place, its top is flush with the barge deck.

The 40-ton crane then lifted the barge end of the left ramp. At the same time two bulldozers began pulling the beach end of the ramp until the barge end was level with the large platform. The crane then lowered the ramp on to the support ledge. The ramp was then secured. This operation took only 5 minutes each for both ramps. An additional bulldozer was used to push the right ramp against the left. When both ramps were in place, the right side at the beach end was approximately 1 ft higher than the left. This was the situation when activities ceased at the end of the working day.

The next morning, November 4, two 4-ton cranes attempted to lift the beach end of the left ramp in order to shore it up to the height of the right ramp. The weight of the ramp was estimated at 45 tons. By lifting only one end, the total lift was only about 17 tons. Two attempts to lift the ramp were unsuccessful, and the 4-ton cranes were secured. However, two bulldozers, working in unison, were able to lift the end of the ramp. Shoring was installed and proper horizontal alignment achieved.

When both ramps were properly positioned and secured to the pier, a last ramp was constructed by two bulldozers. Immediately thereafter, an Assault Vehicle Landing Bridge (A.L.B.) positioned its scissored landing bridge over the ramp ramp to the pier ramps. No problems were encountered with the A.L.B. Total time for the A.L.B. operation was 4 minutes.

A final beach grading was completed at 1600 and the pier was ready for operations. Total elapsed working time for the ramp emplacement was

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111 operations resumed during a lunch break between 1145 and 1155. During this time, the weather was all right. Two milvans were on the pier waiting to be loaded into the marshalling area. These milvans were ultimately loaded into the LASH barge after the pier approximately 4 hr after being offloaded from the ship.

Afternoon operations consisted of two loaded LASHs docking and disdocking. The milvans were then loaded into these LASHs after which operations were secured.

Early the next day, 12 November, the A-1B scissor ramp was removed. Temporary ramps and the matting were substituted, together with Morat for the heavy lift crane. At this time seas were rough with wave heights estimated at 10 ft with winds at 15 knots.

The LASH barge arrived at the pier but because of the bad conditions, the crane could not get it. The crane would get out wherever it made contact with the barge. Several unsuccessful attempts to lift the milvan out of the LASH were made. Therefore, all operations were postponed.

The LASH barge returned to the pier at 1119 after some difficulty with the crane. The crane was damaged and the LASH departed. Operations were called off the pier because of the rough wind and seas.

During the day, the four milvans were rapidly loaded into a LASH barge. These milvans had been prepositioned on the pier before the barge moored at the pier. After the barge was loaded, two LASHs arrived.

One was loaded with one container and the other was empty. The container was loaded, offloaded, and then loaded three times. Average cycle time was 5 minutes.

Work was also done during the lunch break. At 1400 a LASH barge arrived at the pier for welding repairs. The repairs continued throughout the day. A 1 ft x 1 ft plate was welded over a hole inflicted above the waterline. This operation took up one whole side of the pier and restricted all other operations to the other side.

During the remainder of the day, the LASHs were loaded with containers. There were no apparent difficulties.

APPENDIX C

TEMPORARY CONTAINERSHIP DISCHARGE FACILITY (TCDF)

GENERAL

The Heavy-Lift Breakbulk Ship Pretest helped provide data on crane capabilities and limitations in the important area of Temporary Containership Discharge Facility (TCDF) operations. This pretest was the first opportunity to use the Army's LWR A250 (300-ton lifting capacity) crane on a floating Barge barge for the discharge of containers from the holds of a ship. In addition, it was the first time military operators were used to conduct TCDF-containership operations. Although there were some artificialities due to the lack of container cell guides, the need to top the crane boom to clear the ship's booms and kingposts, and the limited opportunity for establishing a rhythmic unloading, valuable data and insights were gained.

DISCUSSION

As of this report, it is uncertain what capacity load can be safely lifted by a mobile crane mounted on a floating platform when the crane (and platform) moves in response to waves or to the load. That is, when waves are moving the platform, different kinds of stresses occur in the crane from those experienced on solid ground. Accordingly, the crane lift capability is reduced to allow for such extra or different stresses; in other words, the crane must be derated for operations in a seaway. It is possible that the point may be reached where the crane on the barge cannot safely hoist the heaviest loads. In that case, in attempting a lift there is the possibility of a catastrophic failure to some component of the crane.

TABLE 1
 SUMMARY OF DATA FOR THE STUDY OF THE
 EFFECTS OF THE MONITORING OF THE WATER QUALITY

| STATION | DATE | WATER QUALITY MONITORING DATA | | | |
|---------|--------|-------------------------------|------------------|-----|--------------|
| | | TEMPERATURE | DISSOLVED OXYGEN | PH | CONDUCTIVITY |
| 1 | 1/1/71 | 15.2 | 8.5 | 7.2 | 150 |
| 2 | 1/1/71 | 15.1 | 8.4 | 7.1 | 148 |
| 3 | 1/1/71 | 15.3 | 8.6 | 7.3 | 152 |
| 4 | 1/1/71 | 15.0 | 8.3 | 7.0 | 145 |
| 5 | 1/1/71 | 15.4 | 8.7 | 7.4 | 155 |
| 6 | 1/1/71 | 15.2 | 8.5 | 7.2 | 150 |
| 7 | 1/1/71 | 15.1 | 8.4 | 7.1 | 148 |
| 8 | 1/1/71 | 15.3 | 8.6 | 7.3 | 152 |
| 9 | 1/1/71 | 15.0 | 8.3 | 7.0 | 145 |
| 10 | 1/1/71 | 15.4 | 8.7 | 7.4 | 155 |
| 11 | 1/1/71 | 15.2 | 8.5 | 7.2 | 150 |
| 12 | 1/1/71 | 15.1 | 8.4 | 7.1 | 148 |
| 13 | 1/1/71 | 15.3 | 8.6 | 7.3 | 152 |
| 14 | 1/1/71 | 15.0 | 8.3 | 7.0 | 145 |
| 15 | 1/1/71 | 15.4 | 8.7 | 7.4 | 155 |
| 16 | 1/1/71 | 15.2 | 8.5 | 7.2 | 150 |
| 17 | 1/1/71 | 15.1 | 8.4 | 7.1 | 148 |
| 18 | 1/1/71 | 15.3 | 8.6 | 7.3 | 152 |
| 19 | 1/1/71 | 15.0 | 8.3 | 7.0 | 145 |
| 20 | 1/1/71 | 15.4 | 8.7 | 7.4 | 155 |

NOTE: The data were collected from the monitoring stations during the period of the study. The data were collected from the monitoring stations during the period of the study. The data were collected from the monitoring stations during the period of the study.

Figure 11 illustrates the clearances and reach dimensions that are required in the pretest in which the heavy-lift ship was acting as a substitute for a container ship. A reach to the centerline of the ship is necessary to remove hatch covers on many container ships. The designers of container ships, by generally, follow the rule that a hatch cover can be no heavier than the heaviest container to be lifted from the holds of that ship. This limits the maximum heavy-lift requirement to a maximum of 20,000 lb or the equivalent weight of a single container and that of a spreader bar needed to lift it. In general, only heavy-lift containers hatch covers weigh considerably less but a factor that is variable in interpreting the maximum requirement.

The heavy-lift ship has a clear $\frac{1}{2}$ to $\frac{2}{3}$ half of this distance, the distance to the cargo centerline, about $\frac{1}{2}$ the tender between the large and the small, and the half-ton $\frac{1}{2}$ the large produced a more than requirement $\frac{1}{2}$ to $\frac{2}{3}$ the water to open the hatch of the heavy-lift breakbulk ship. This distance is $\frac{1}{2}$ to $\frac{2}{3}$ the water in figure 11. It may be noted from table 11 that, under the normal current operating scale for this distance, a hatch cover of a fully loaded lift tender must be lifted. In fact, there is a fairly light and a heavy lift ship in a sea state one. This is approximately the last and most severe of the 10 sea states for the type ship chartered by the War Relocation Authority, and in these are the calm seas and a relatively light spreader bar, 10,000 lb. (4500 kg.).

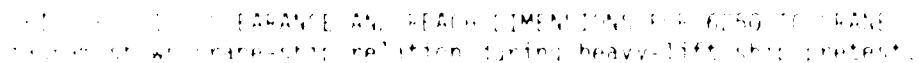
For water clearances that have beams of approximately 95 ft, the reach would have to be greater. If it is desirable for ships this wide that the 10-ft clearance in the centerline, the reach would have to be at least 10 ft. However, under current loading criteria the crane would not be able to reach 10 ft out with a 100-ton ship designed for 27-ft containers with a 100-ton reach. If 100 ft, the lift would be within the limits of the derated crane.

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Lichtenthaler and Sponholz (1980).

The new, left-handed, ship's rudder was conducted using a 10-ton rudder gear. The longer a turn is, of course, the more it weighs and the greater the power must be put in. However, there are circumstances that may require the use of a larger beam line to turn a ship. For example, in some circumstances, ship stability, and sheer and

1. The containers of the 1000 are used on the protest with generally one or two being placed in these containers from batches directly imported into the country, especially with respect to these containers from the container 1000, it is little that reach only to the center of the container, will regenerate frequent repackaging in order to place the 1000 in the center near the exterior within the poor's living room.

The court's rationale, "ownership type chartered to be a ship, with the right to fly the flag of the center of gravity for the nation," seems to be based on the ship's centerline. Therefore, the result will be that the vessel within the 12-mile zone state the validity.



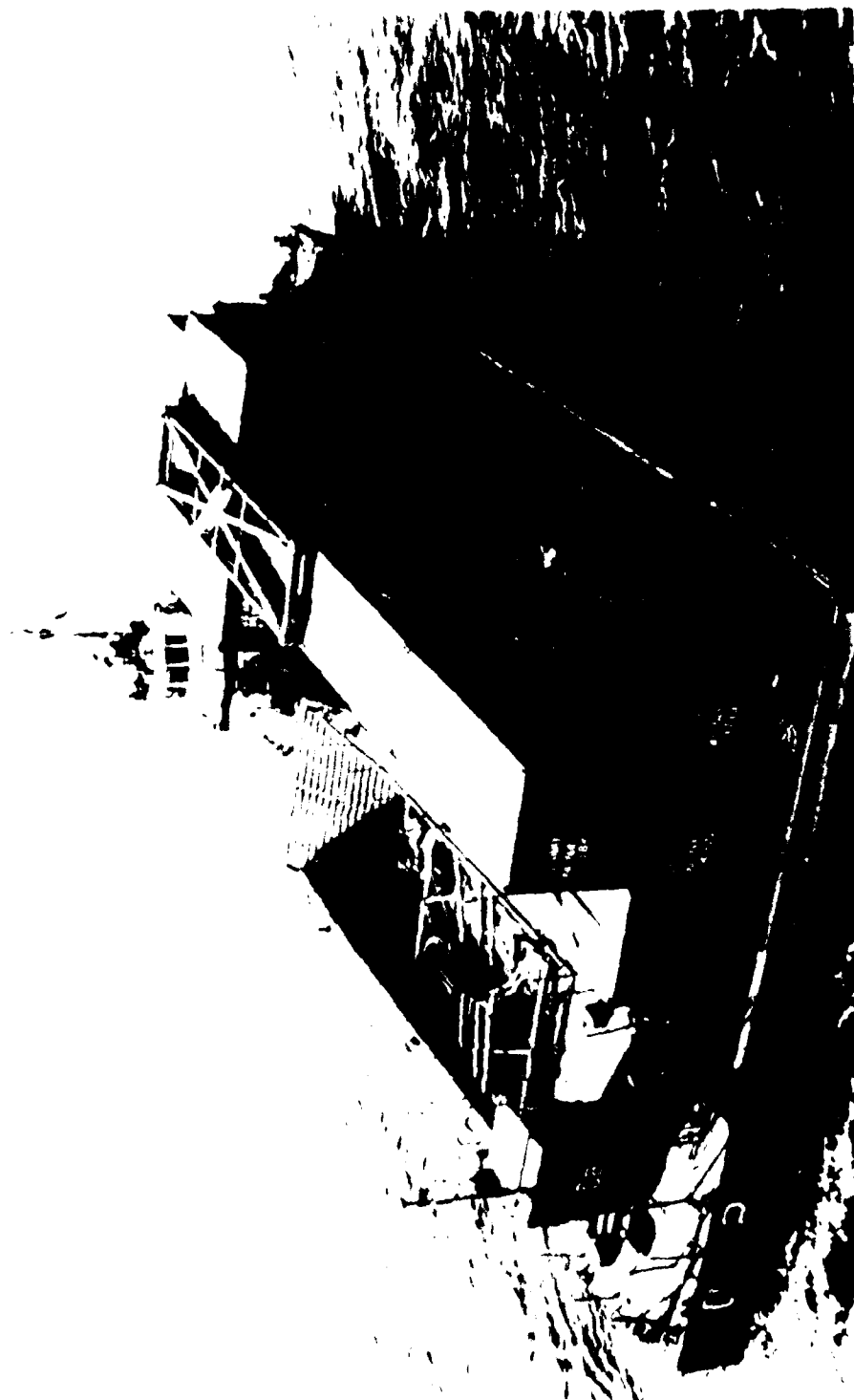
With the range of weights and vessel characteristics now known, more detailed planning for the configuration and operation of the port crane on the 10,000-ton large type ship can be done.

APPENDIX I

LIST OF NAMES OF MEMBERS OF THE BOARD OF DIRECTORS



FIGURE 1. S.S. TRANSCOLUMBIA, KING PIERCE. The S.S. TRANSCOLUMBIA, one of two heavy-lift breakbulk ships under long-term charter to the Ministry of Defense, was used November 2-7, 1974, for the third of three exercises. The primary objective of the exercise was to load 100,000 heavy and oversized equipment and harbor, and as it from the ship at anchor in the pier sea, and distribute it ashore for the conduct of the same carrier throughout operations.



The first thing I noticed when I stepped out of the car was the cold, crisp air. It was a relief after the warm, humid weather of the South. I walked towards the entrance of the building, my eyes drawn to the ornate architecture. The building was a grand structure, with many windows and a high ceiling. I felt a sense of awe and wonder as I entered the room.





FIGURE 3.4. 40-FT CONTAINER. One 40-ft container was included in the load to provide data and experience in handling a 40-ft container which weighed 14,100 lbs.



FIGURE 1.5. DECK PREPARED. Lunnage was laid on deck in preparation for the heaviest lift made in the LIFT pretest program, a 1466-class Army LC-16. Each of the two heavy-lift ships (the only heavy-lift ships currently in the U.S. flag fleet) can carry four of these large landing craft. A 1646-class LC-16 could not be lifted because neither the ship nor the Navy had the necessary sling.



FIGURE 1-6. BOOM MARRIAGE. To lift the 180-long ton LCU, a boom marriage of two 125-long ton capacity booms was made. This gives the ship a 250-long ton capability, although reportedly the ship has lifted and carried a 300-long ton tug.



FIGURE 1. LIFTED WITH EASE. The LCU lift, although infrequently accomplished, was made with relative ease. Military personnel acted as stevedores but the ship's company operated all machinery and directed the technical aspects of the lift.



FIGURE 1. (a) The ship's hull and superstructure during the test. (b) The ship's hull and superstructure during the test. (c) The ship's hull and superstructure during the test. (d) The ship's hull and superstructure during the test. (e) The ship's hull and superstructure during the test. (f) The ship's hull and superstructure during the test. (g) The ship's hull and superstructure during the test. (h) The ship's hull and superstructure during the test. (i) The ship's hull and superstructure during the test. (j) The ship's hull and superstructure during the test. (k) The ship's hull and superstructure during the test. (l) The ship's hull and superstructure during the test. (m) The ship's hull and superstructure during the test. (n) The ship's hull and superstructure during the test. (o) The ship's hull and superstructure during the test. (p) The ship's hull and superstructure during the test. (q) The ship's hull and superstructure during the test. (r) The ship's hull and superstructure during the test. (s) The ship's hull and superstructure during the test. (t) The ship's hull and superstructure during the test. (u) The ship's hull and superstructure during the test. (v) The ship's hull and superstructure during the test. (w) The ship's hull and superstructure during the test. (x) The ship's hull and superstructure during the test. (y) The ship's hull and superstructure during the test. (z) The ship's hull and superstructure during the test.

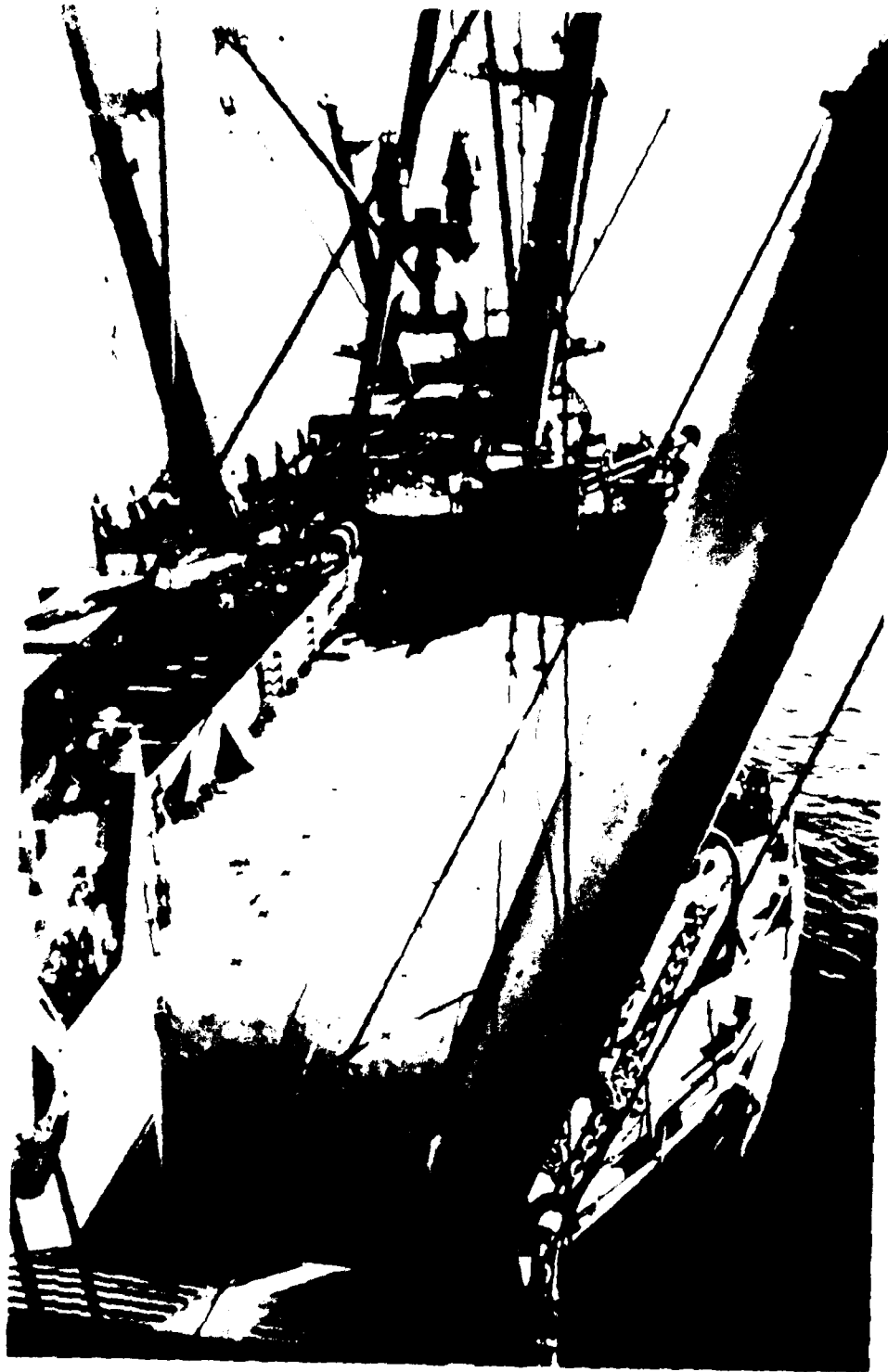
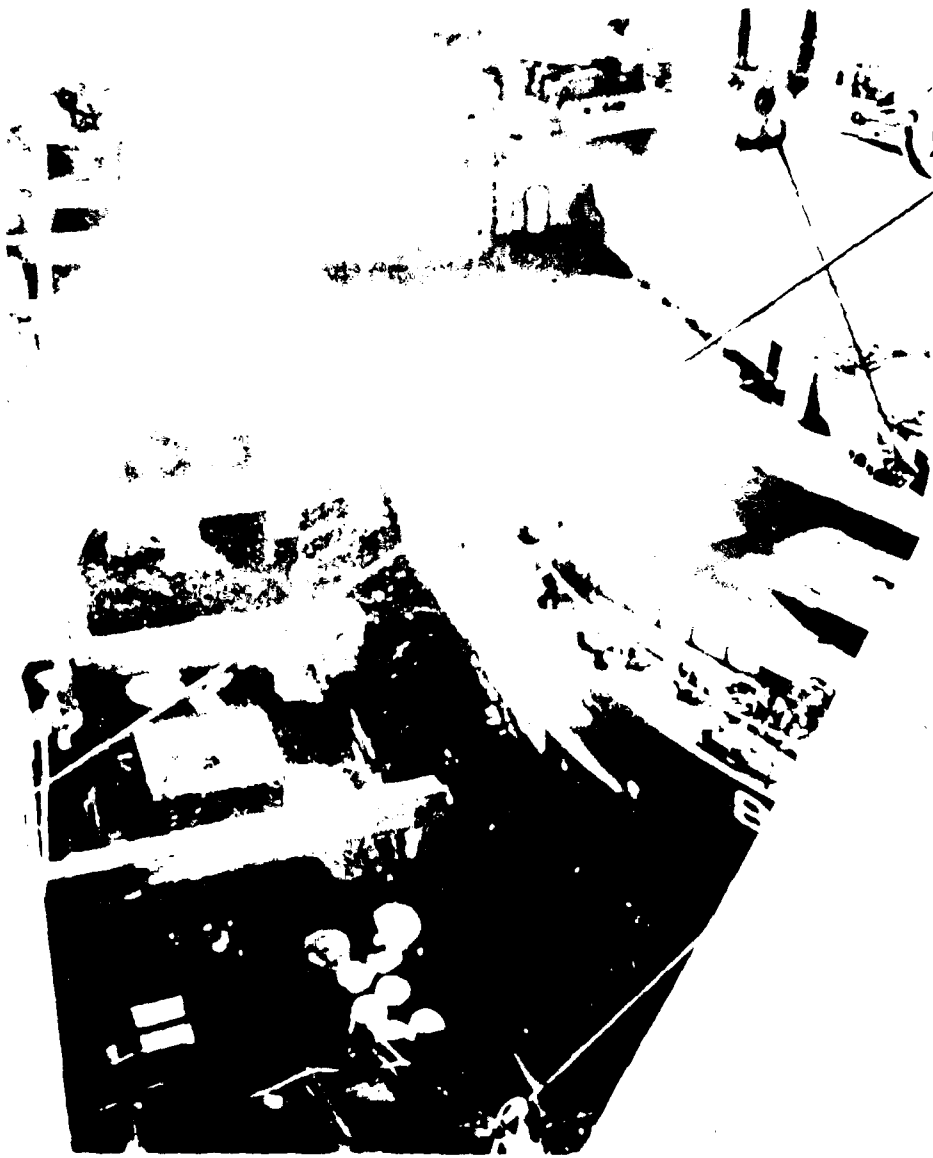


FIGURE 1. SPECIAL PREPARATIONS REQUIRED. No special preparations are required to remove the mast for lifting. In this case the 10' mast was lowered to a lower deck level, but this proved to be unnecessary.



1. Aerial view of the coastal area showing the dark landmass on the left and the bright white area on the right. The dark shapes on the right are buildings or structures.



Figure 1. The structure of the ship's hull, showing the internal structure and the external structure. The structure is made of steel and is reinforced with a network of cables and ropes. The structure is being hoisted or lowered by a crane. The image is grainy and has a high level of contrast, with deep blacks and bright whites.



Figure 1. The ship's deck with the antenna and other equipment. The antenna was used for the purpose of the experiment.

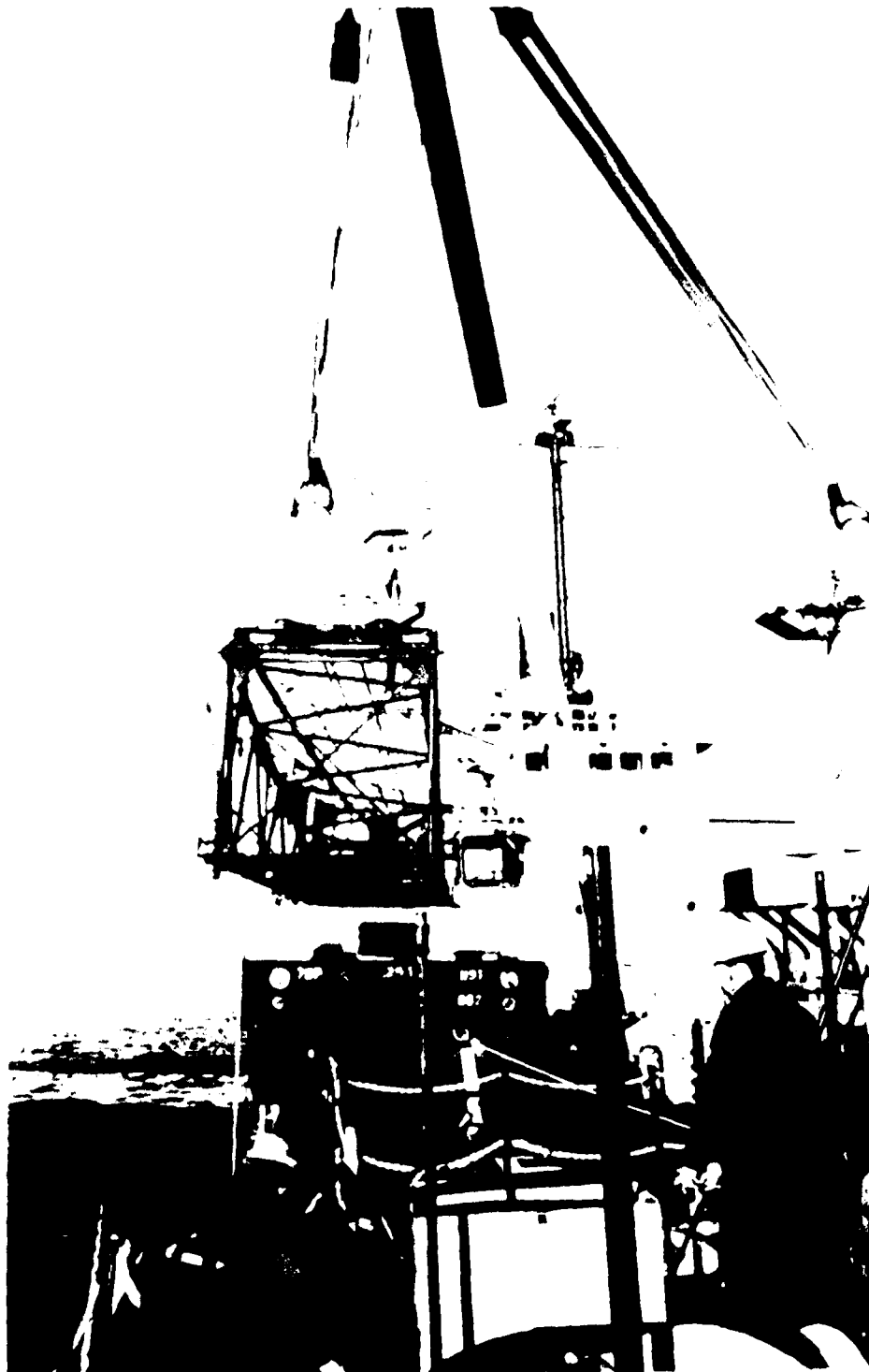


FIGURE 1. VESSEL CRANE LIFTING. In lifting the 14-ton crate into the ship, the ship is 10 ft long, which is 10% ft long, but more than adequate to handle the lifting craft.



U.S. Navy personnel are seen working on the deck of the USS Intrepid (CV-11) during a visit to the Naval Air Station, Alameda, California, in 1964. The ship is a retired aircraft carrier, and the photograph captures a moment of activity on its deck.



The above view provides a perspective of the existing clearance within the structure. The structure has a minimum clearance of 10 feet and a clearance to the top of the structure of 15 feet.

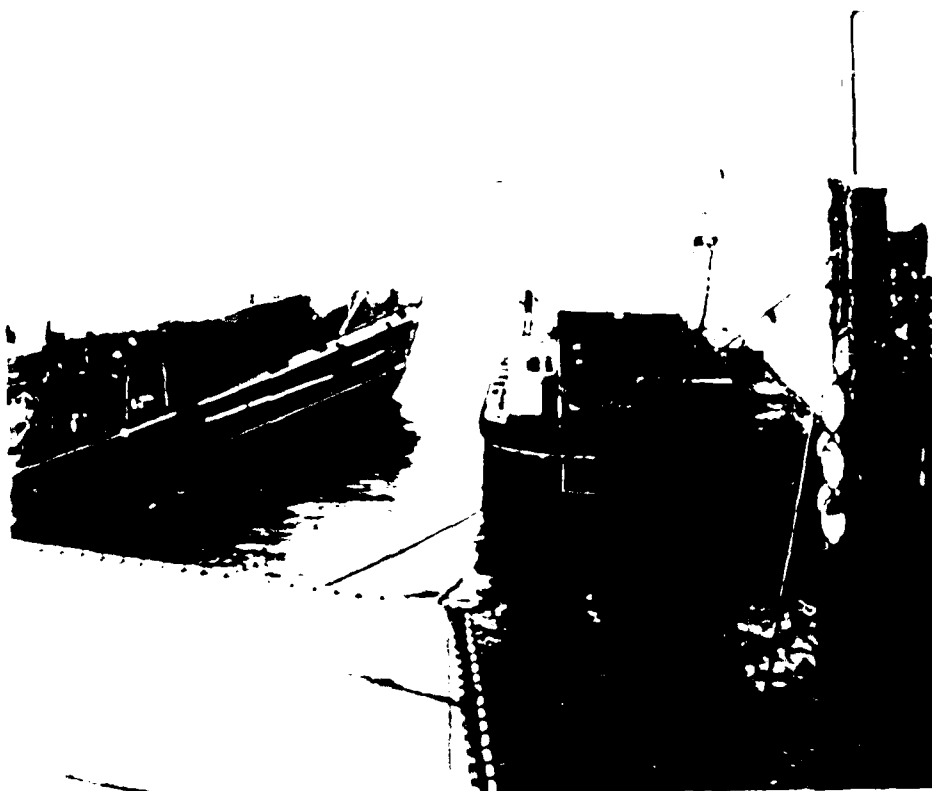
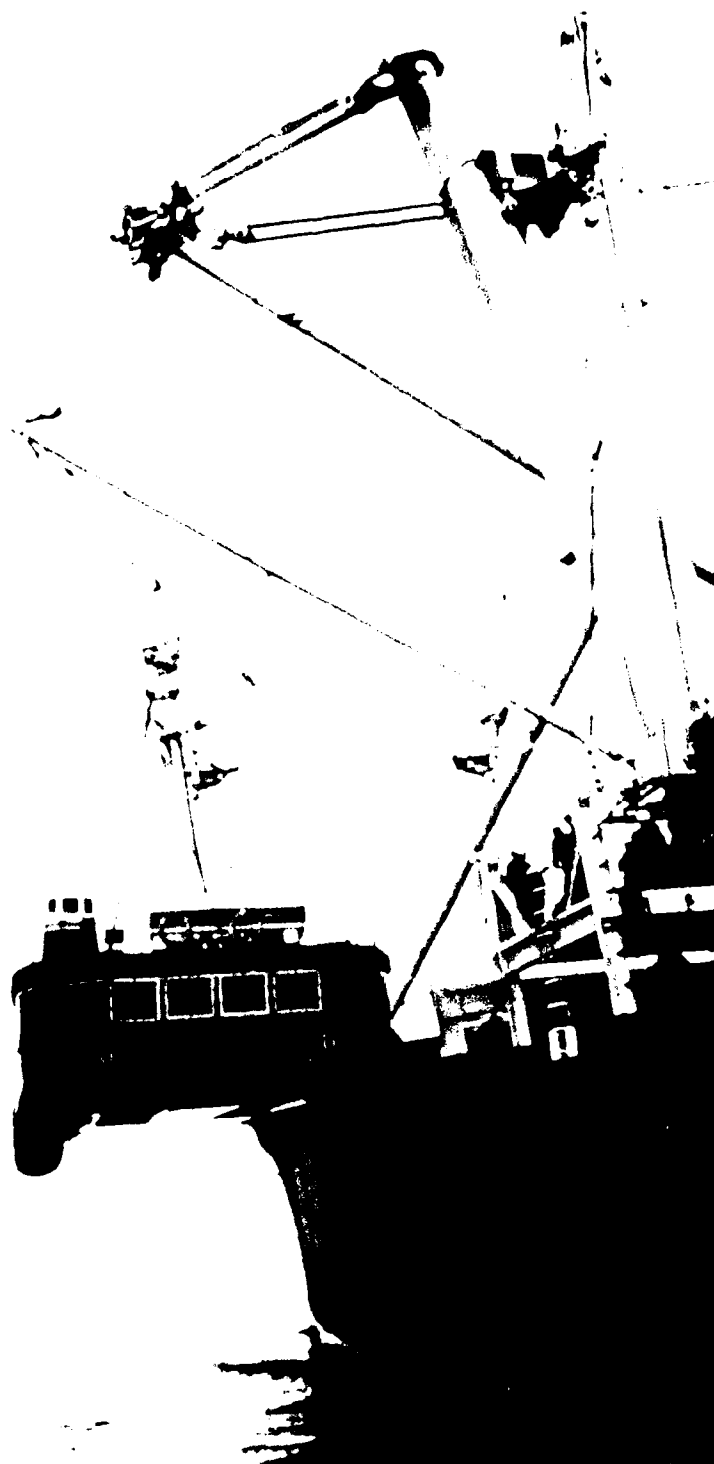


FIGURE 10. (A) A view of the 10' x 10' x 10' container which weighs 10,000 lbs. and has a height of 10' x 10' and a width of 10' x 10'. It can be lifted and externally moved only by a heavy lift truck.



U.S. NAVY. A MINITEL (MINI-TELETYPE) SYSTEM IS USED TO TRANSMIT DATA FROM THE SHIP'S COMPUTER TO THE SHORE. THE SYSTEM WAS INSTALLED IN 1974.

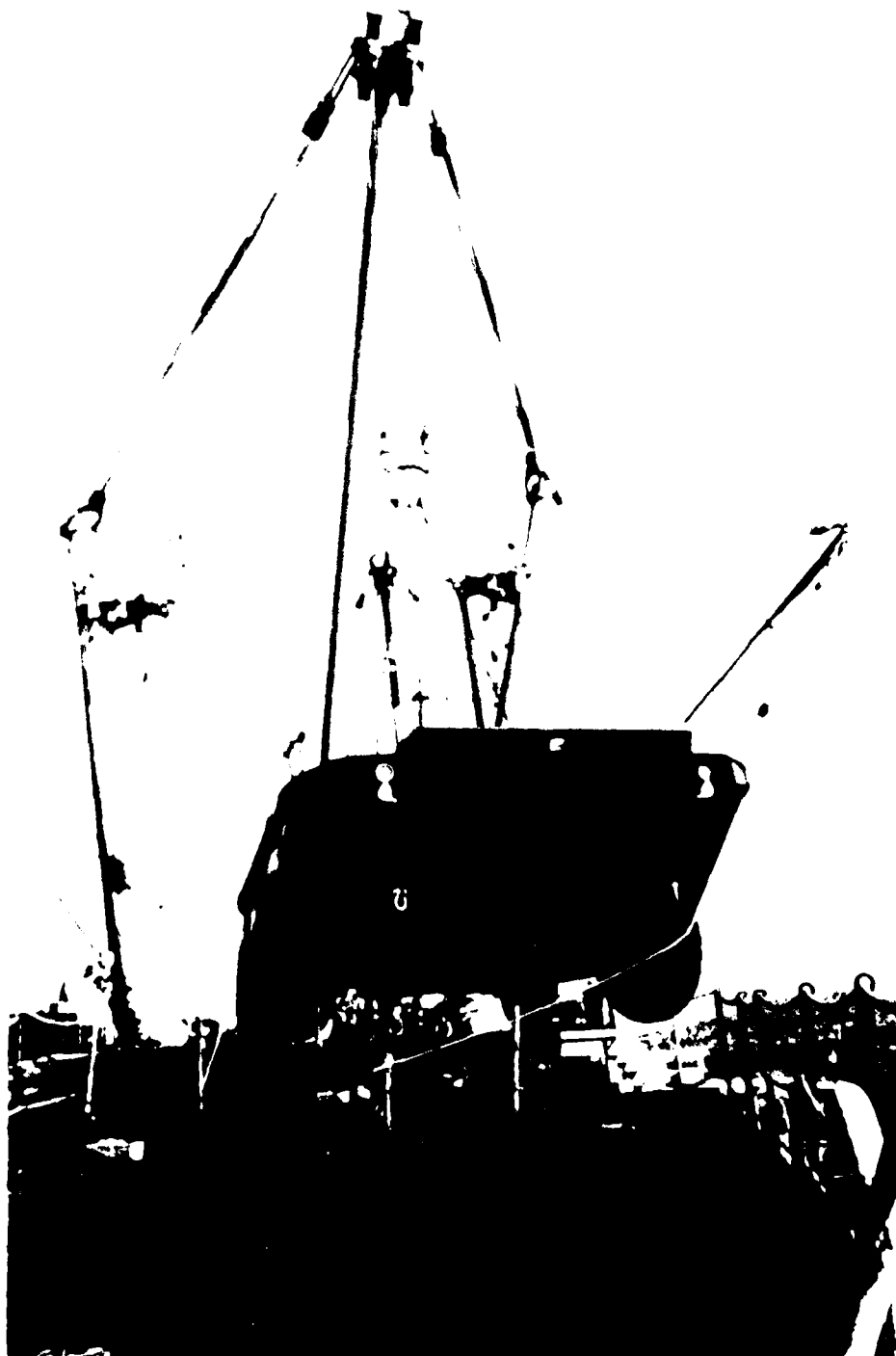
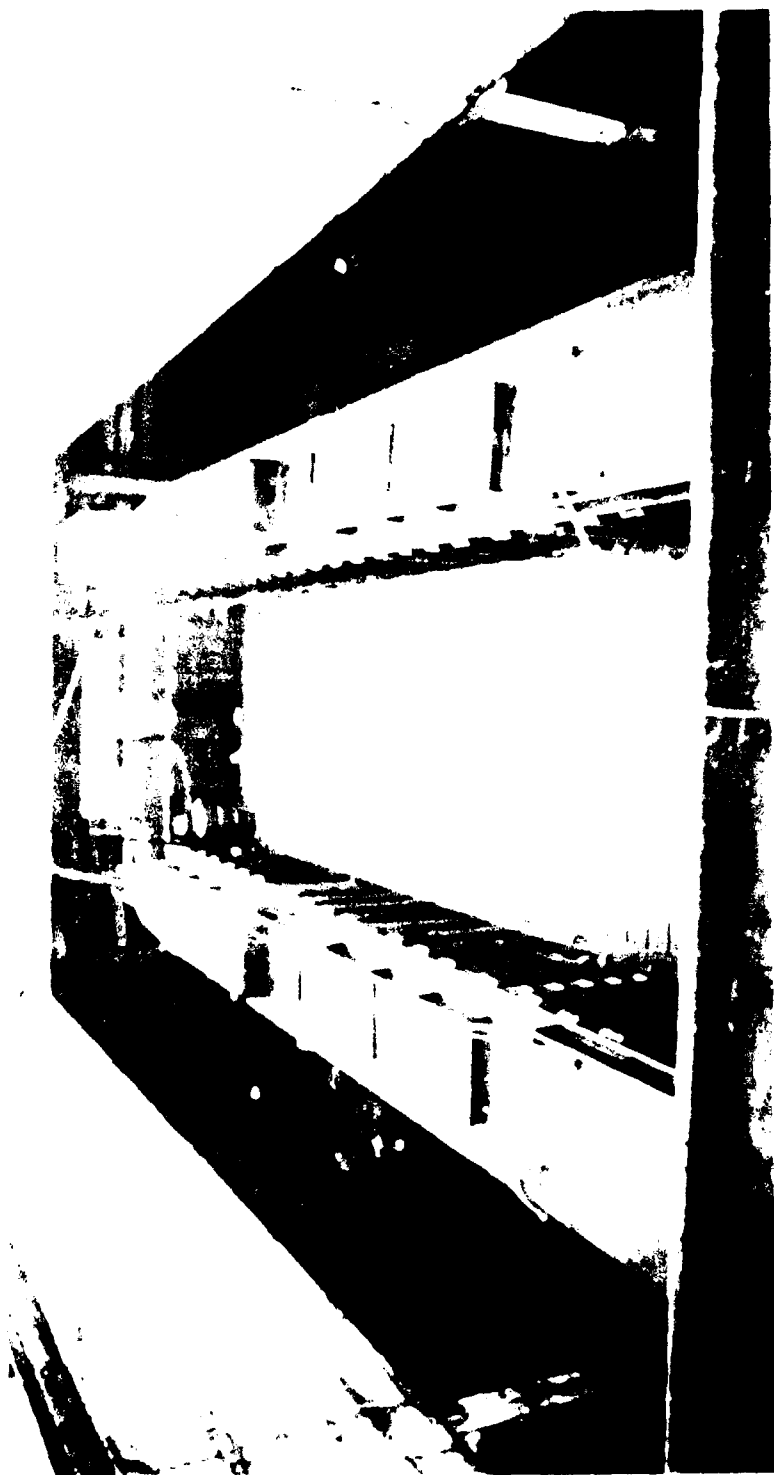


FIGURE 1. OVERHEAD CLEARANCE WITH LRP. No overhead clearance problems were experienced by the 10-ton crane winding the 20,000-lb high LRP-L1 across the deck and over the rails.



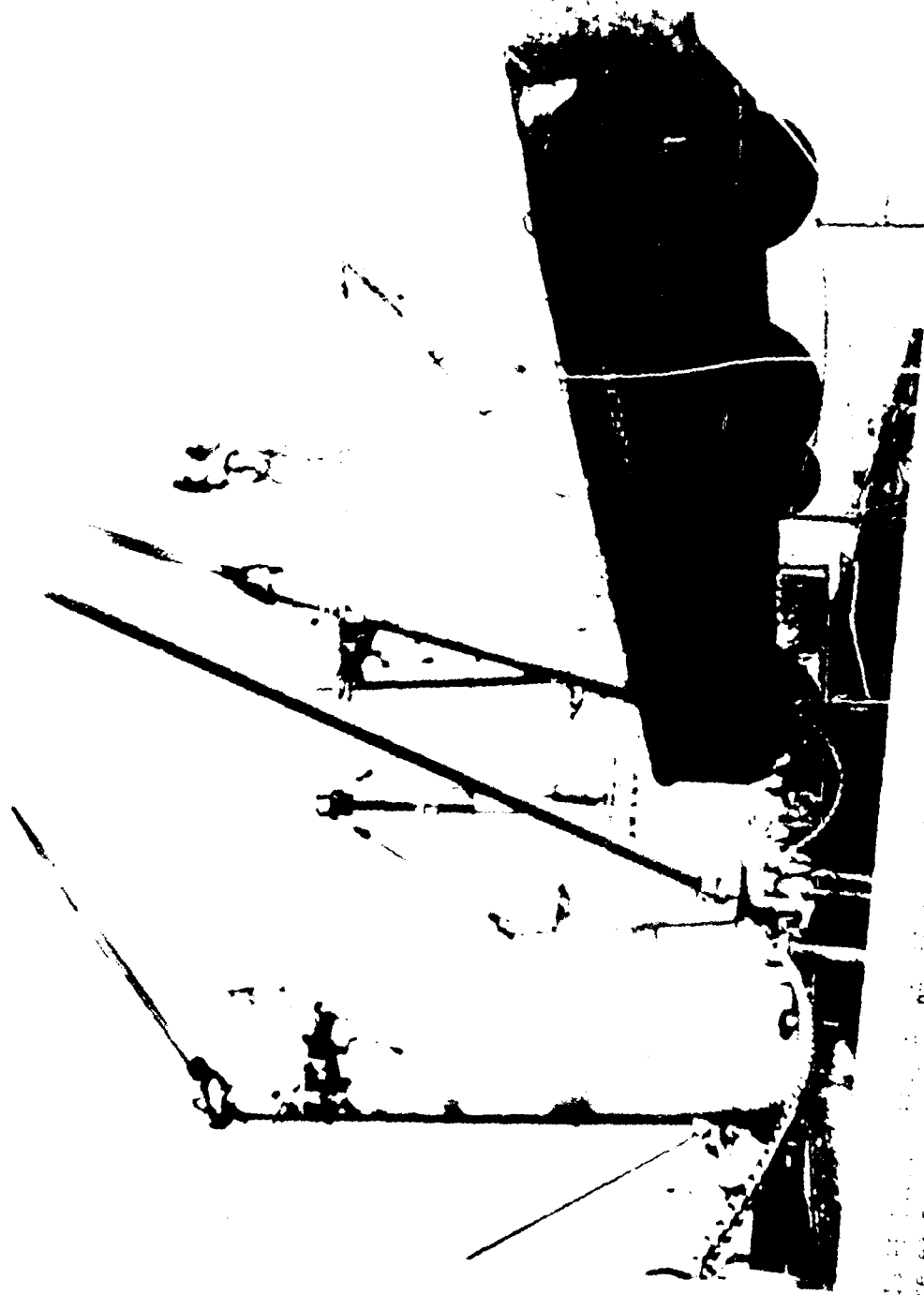
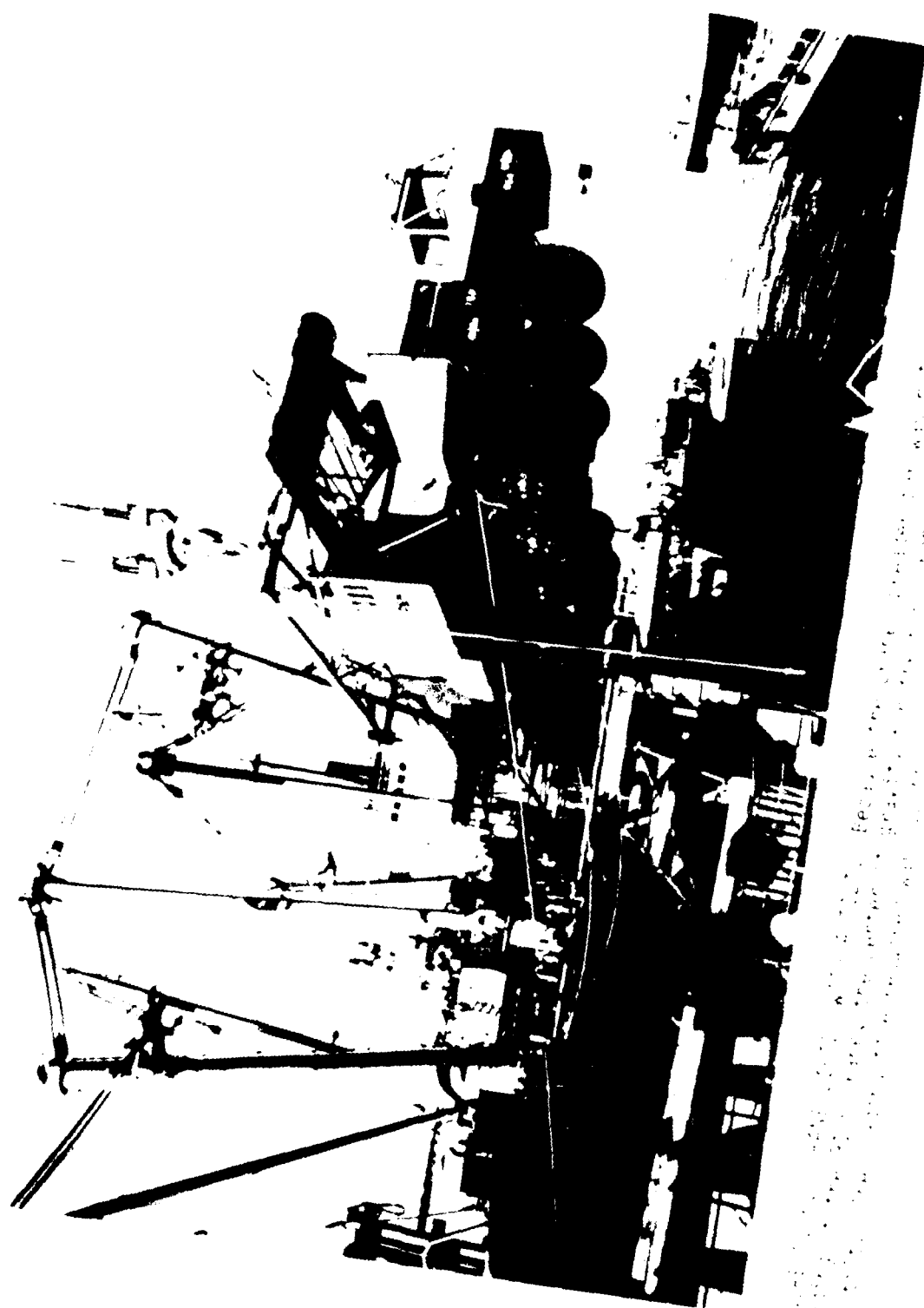




FIGURE 1. A vehicle is hoisted by the MIV-71. Approximately one-third of the 36-minute hoist time was spent waiting for the vehicle to land on the amphibious landing gear and was attributed to the 100-ton



The building is a long, narrow structure, possibly a train car or industrial building, viewed from a low angle. The building is heavily shadowed, with bright highlights on its upper sections and roofline. The image is oriented vertically on the page.









The ship is a large cargo vessel, possibly a bulk carrier, with a prominent mast and rigging. The image is a high-contrast, black and white photograph, showing the ship's hull and superstructure. The ship is docked at a pier, and the image is heavily stylized, with deep shadows and bright highlights.

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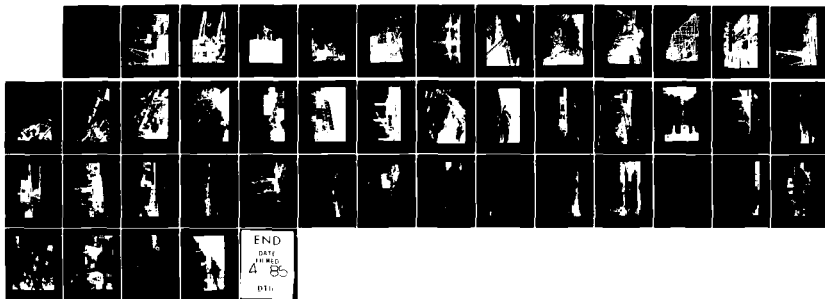
HEAVY-LIFT BREAKBULK SHIP PRETEST RESULTS OF THE JOINT
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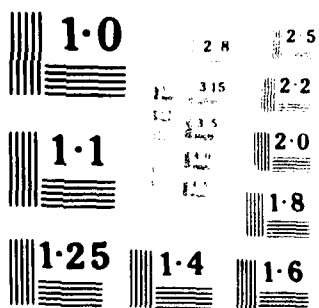




FIGURE D.29. SIDELOADER EASY LIFT. Compared to the other equipment embarked the sideloader went aboard relatively easily. It weighs 64 long tons and is 41 ft long, 12.5 ft wide, and 11.7 ft high.

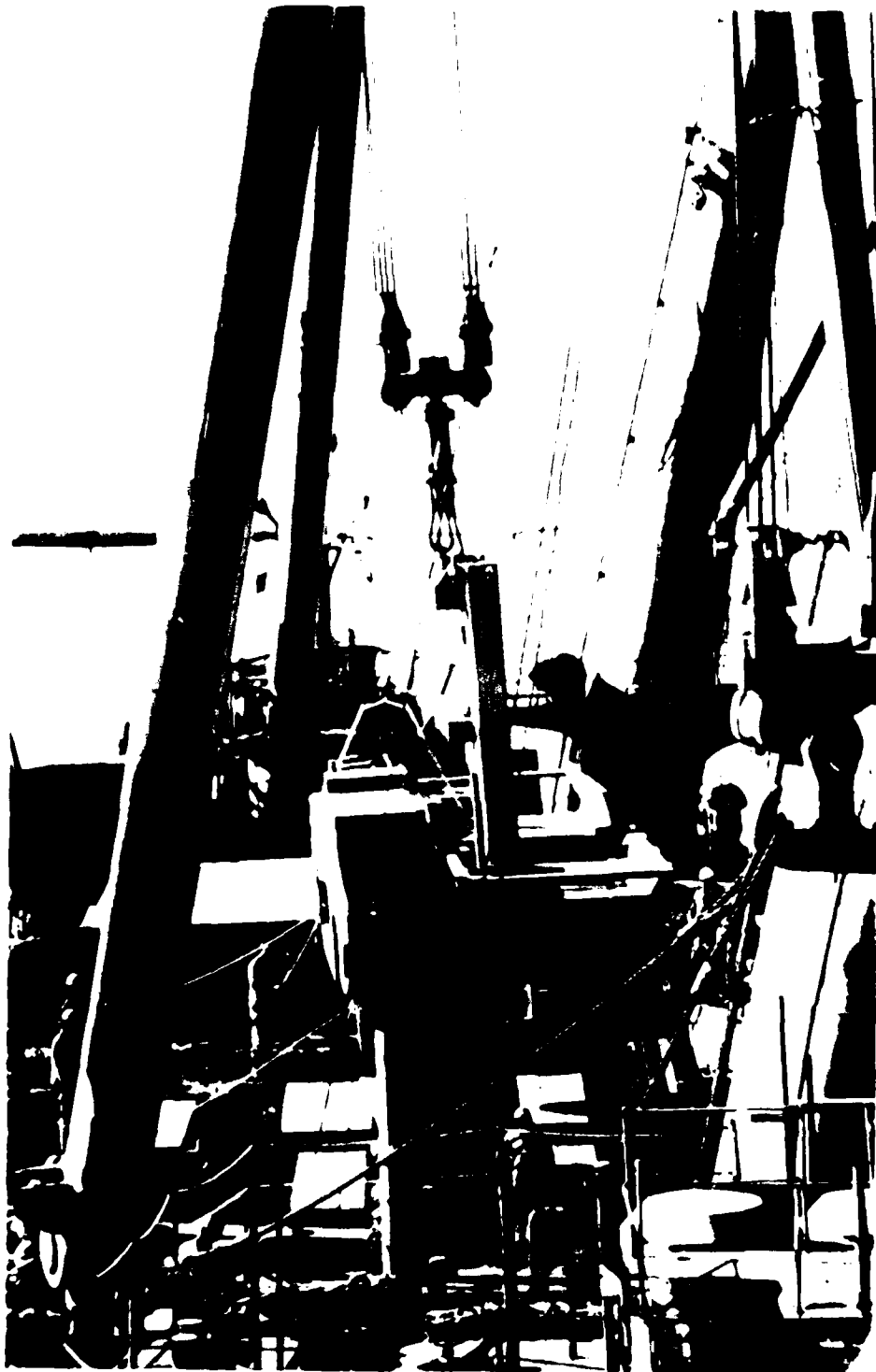


FIGURE D.30. SIDELOADER DECK-STOWED. The sideloader could have been stowed in a hold but to reduce loading time so that other events could be accomplished, it was deck-stowed. Its loading time was only 27 minutes, including rigging time.



FIGURE 1.41. STEEL BEAM. Before lifting the steel beam for lifting it is necessary to climb up and attach the hook. The time to attach and detach the chokers on the hook required a total of 10 minutes for the loading cycle and 9 minutes during off-loading.

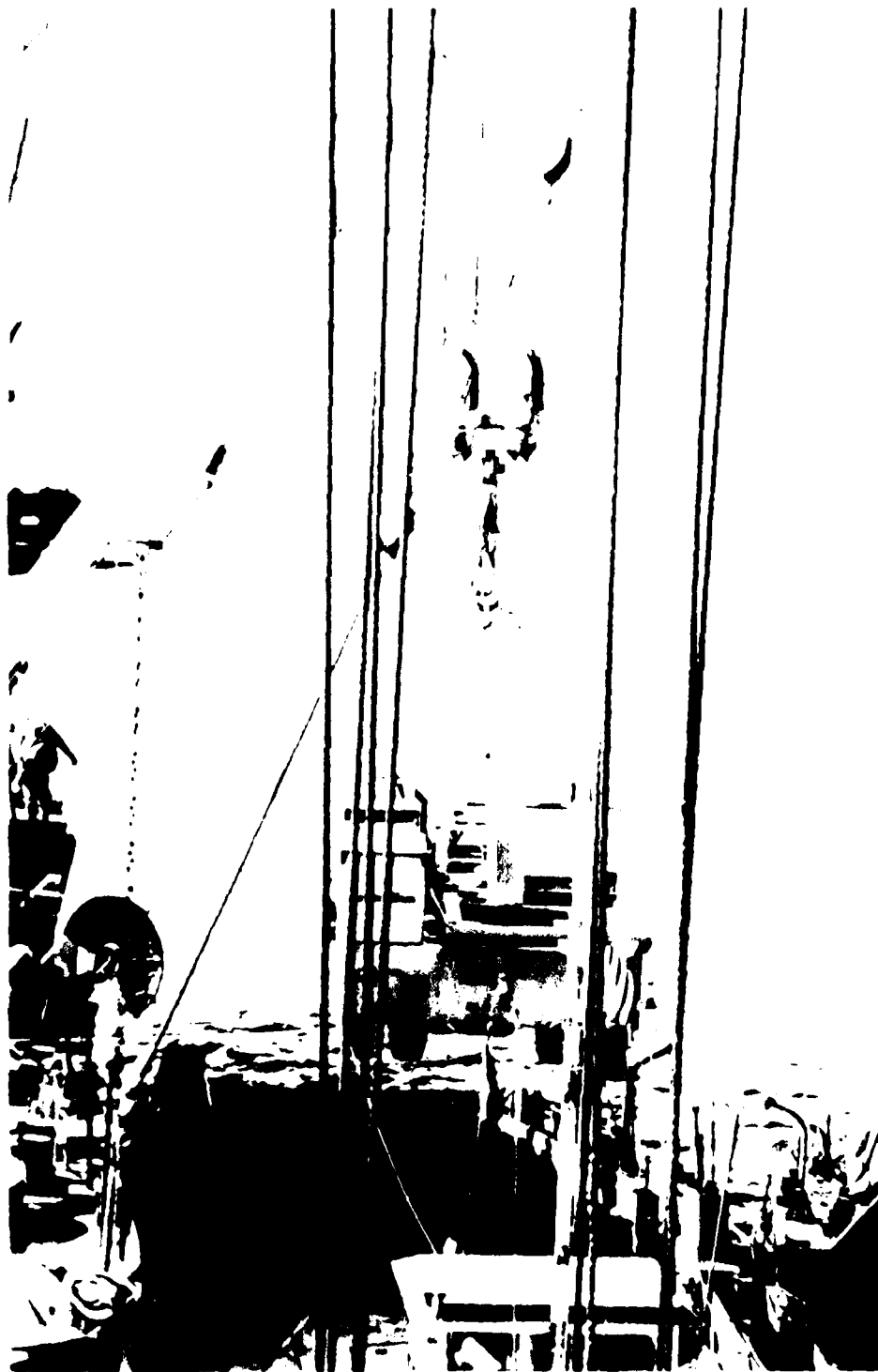


FIGURE D.32. SIDELOADER PLACED IN CLU. No difficulties were experienced off-loading the side loader into an LCU. The sea state was relatively calm and the wind was light.

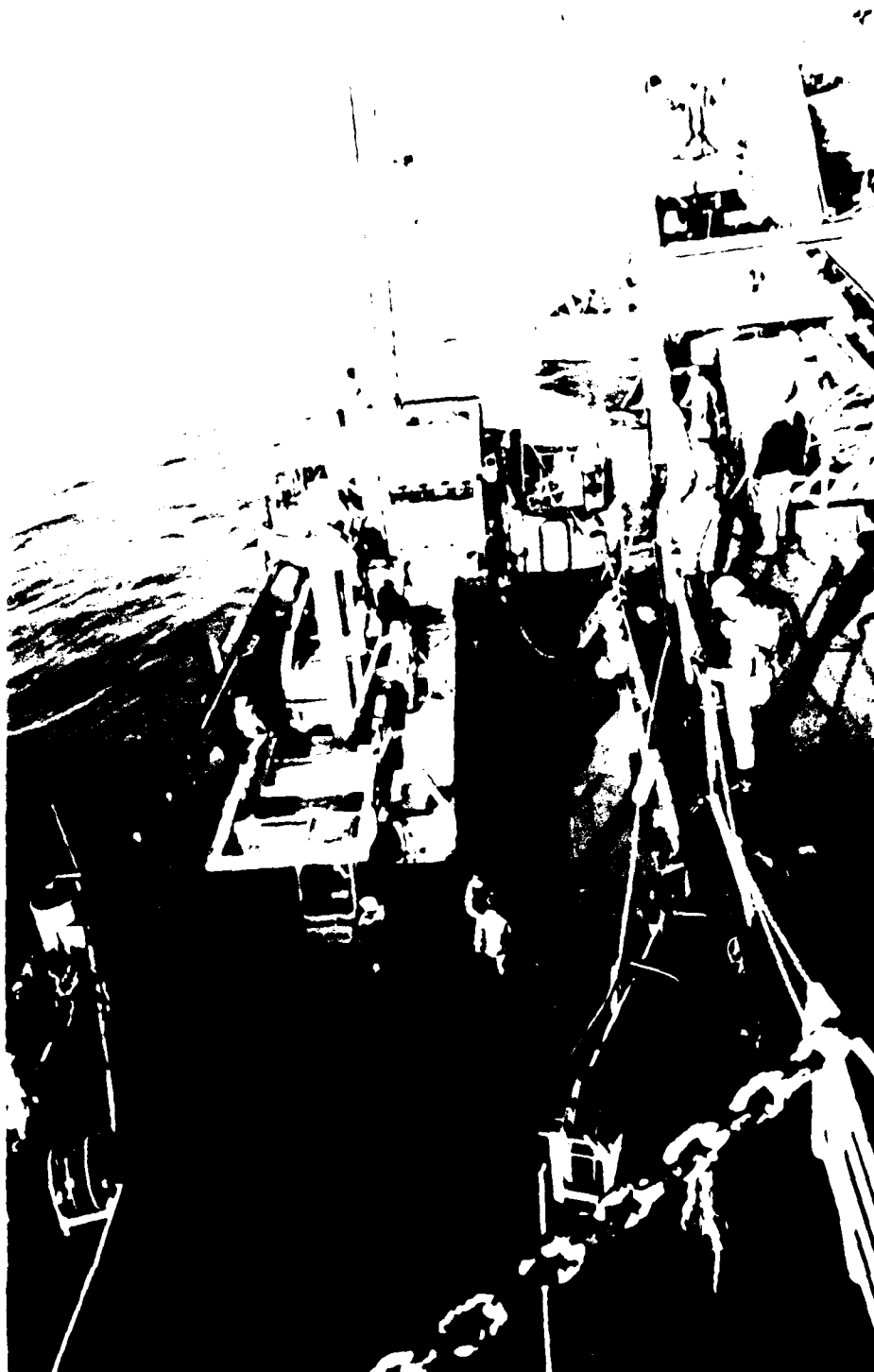


FIGURE 10. OFF-LOADING TIME 34 MINUTES. The side loader lift was the fastest one made. It took 34 minutes to off-load the side loader, including time to hook and cast off the LCU.

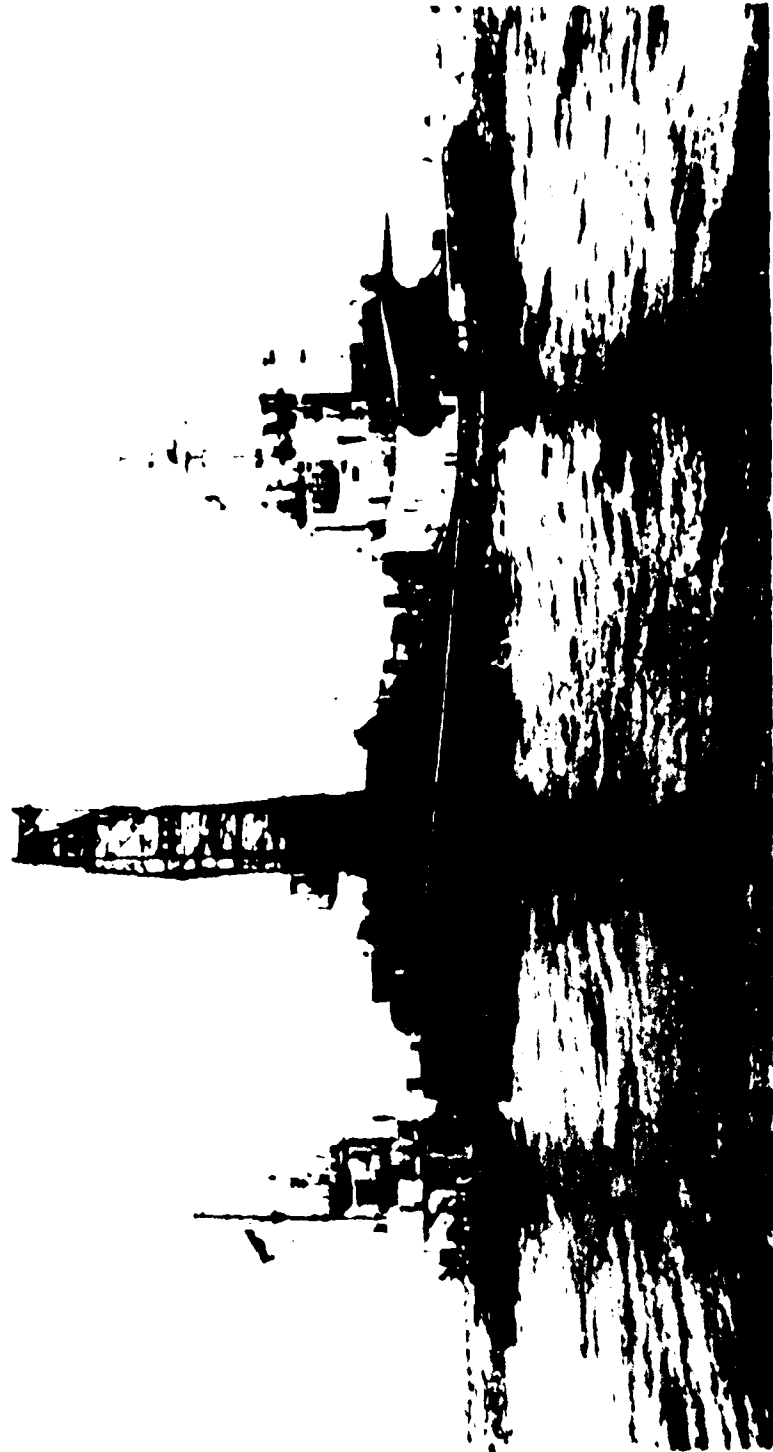


FIGURE D.34. TCDF TOWED TO PRETEST SITE. Once the deployment cargo had been off-loaded, the TCDF was positioned alongside the ship so that containers could be off-loaded and throughput events could begin.

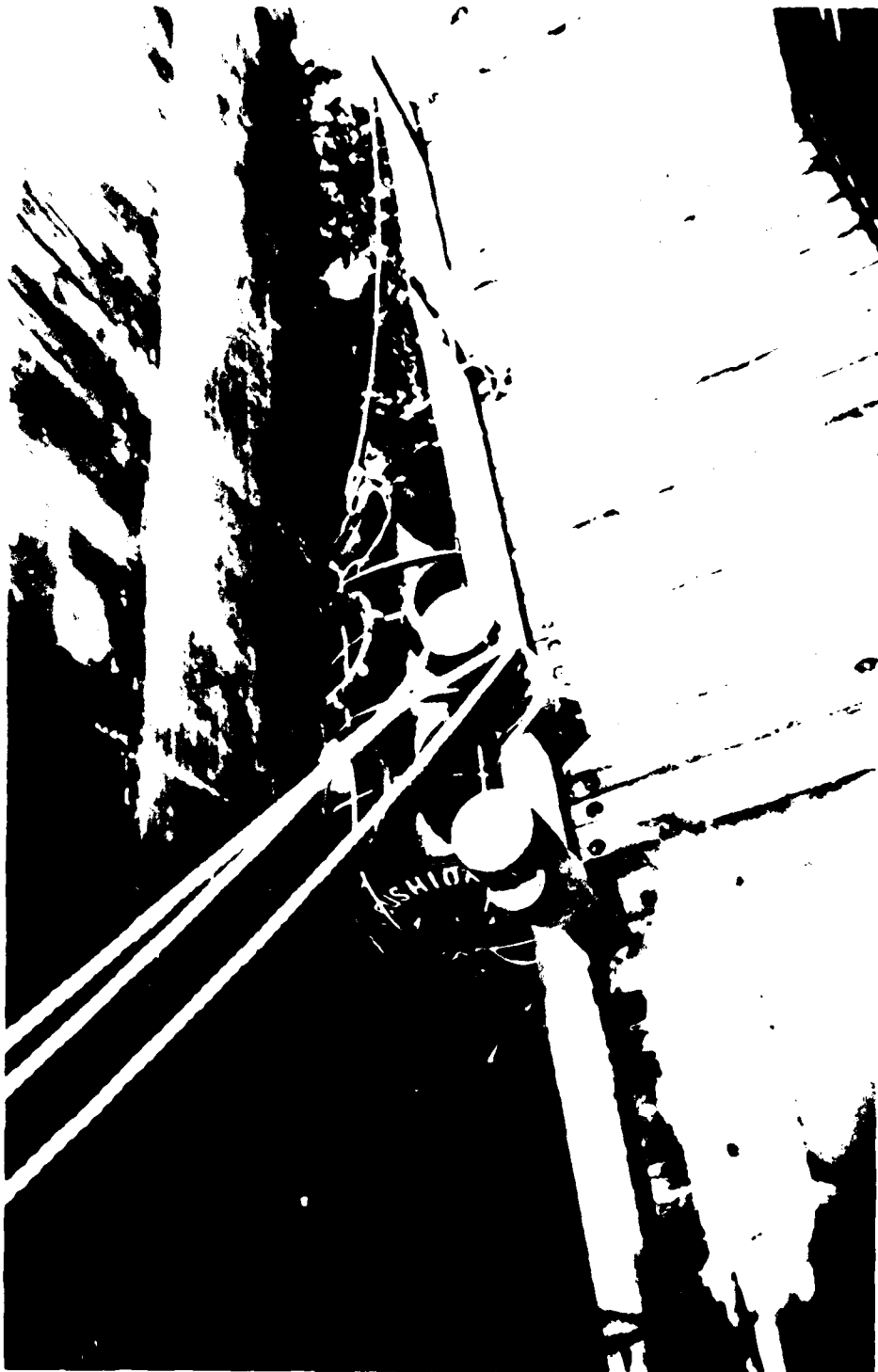


FIGURE D.35. FENDERS USED. Two special inflated fenders, one of which is shown above, were used to separate the TCDF from the ship.



FIGURE 1. Operation of the B.W. After the initial load of containers had been discharged the TCCF was moved to the bow of the ship. Later, when the TCCF had swung into the gap at the bow shown in the photo above, the container spreader had to be turned further to line up with the containers. This was difficult because a two-point attachment was used between the crane and the spreader bar.



FIGURE D.37. TCDF OPENS HATCH. To gain experience and crane data on hatch square opening, the TCDF was used to remove the 5-ton sections of the hatch cover.

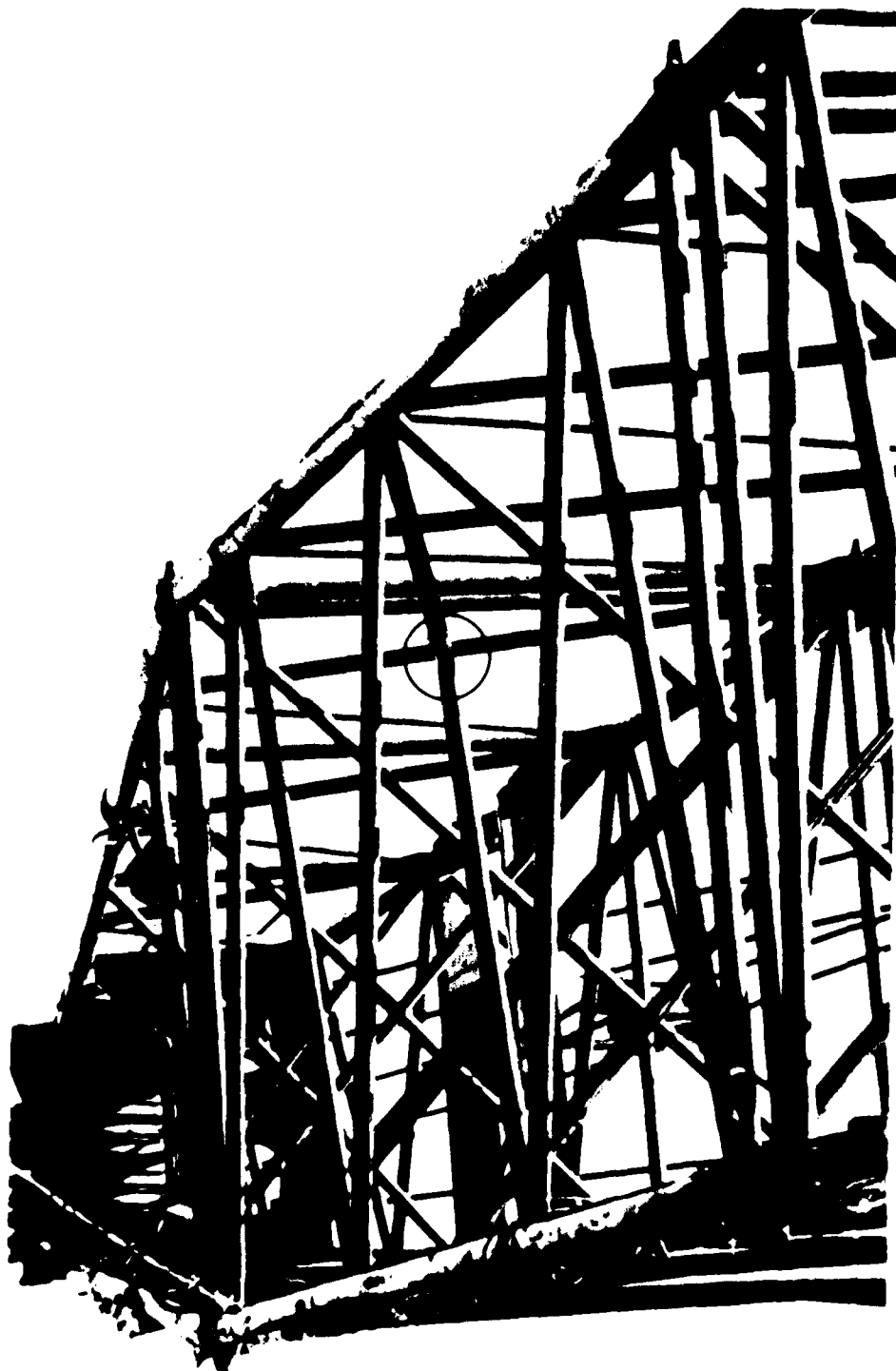


FIGURE D.38. BLOCK DENTS CRANE BOOM. On the first full day of container unloading the sea state caused the crane's block to pendulate during a break in the unloading. The heavy block struck the boom's tubing with sufficient force to seriously dent it.



FIGURE C.39. POSITIONING SPREADER BAR. Without cell guides it was necessary to position the spreader bar manually in the hold. If the boom was not at a 90-degree angle to the container axis, delays and difficulties in attaching the spreader bar were experienced.



FIGURE 2-40. BOW TERS. Once the container was attached the crane had to top up as well as raise the hook in order to clear the ship's booms and kingposts. This led to delays to cycle times that would not be typical of operations on the clear deck of a container ship.

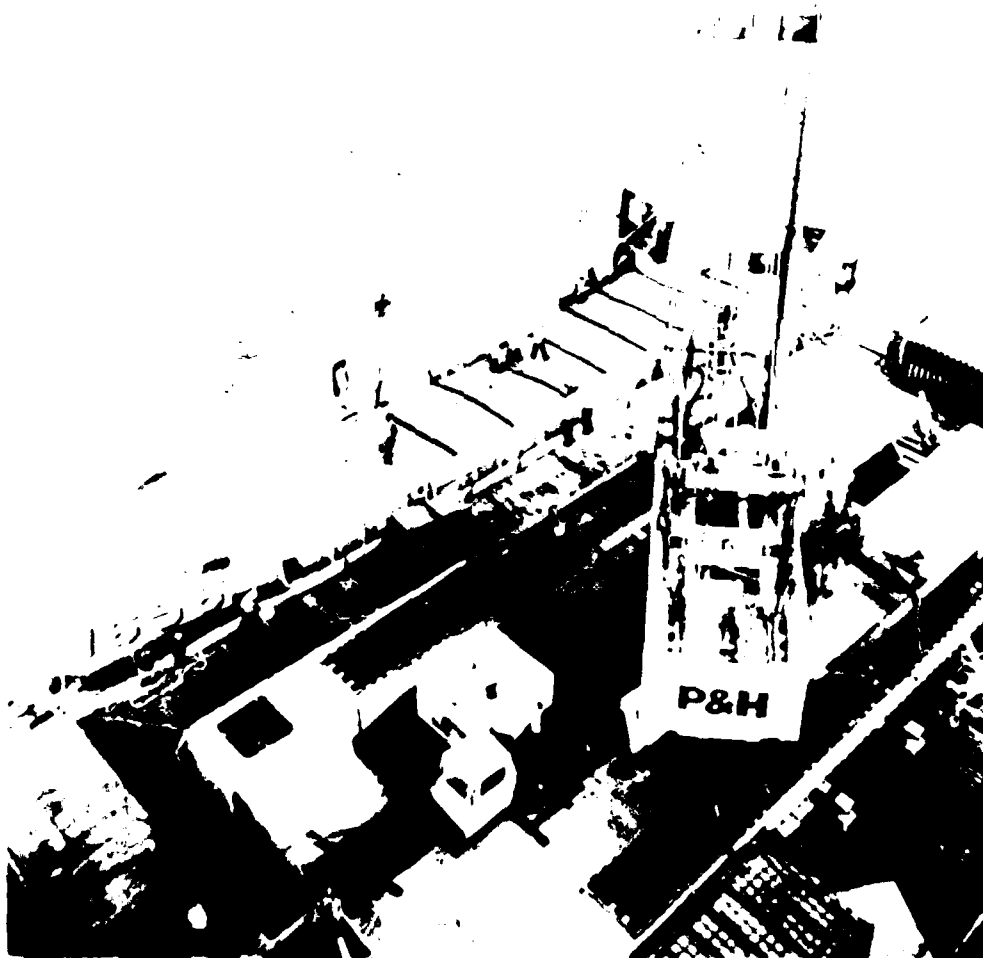


FIGURE D.41. LCU USED FIRE HOSE. To cushion the impact of containers being lowered, a problem when there is a sea state, fire hose was used on the deck of this LCU.



FIGURE D.42. LCU LIGHTLY LOADED. Normally an LCU would be loaded with four containers but because of the limited number of containers available, capacity loading was not practiced.



FIGURE D.43. MOBILE LOADING TIME-CONSUMING. One method of minimizing handling at the beach is to place trailers on a causeway ferry and load the trailers shipside. However, because of the motion of the seas and the need for close alignment during loading, it required approximately an hour to load just two of three trailers and it became apparent that the method was too time consuming.

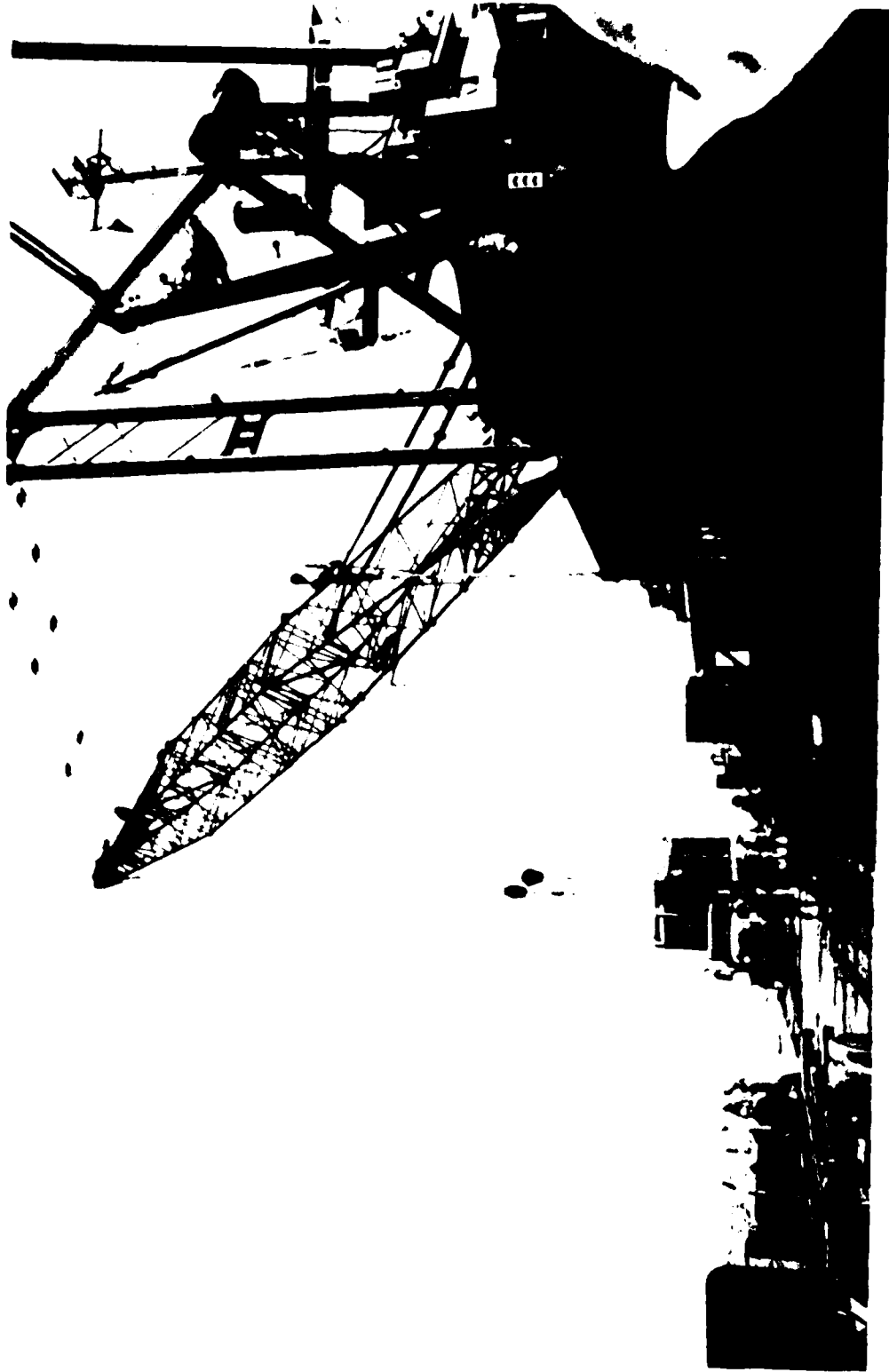


FIGURE D-44. SPREADER BAR NOT ALIGNED. With a two-point spreader bar attachment and automatic taglines, the spreader bar and container were nearly always perpendicular to the boom, while the trailer chassis was not. This necessitated man-handling the container until it was in a position that would permit lowering the trailer corner fittings.

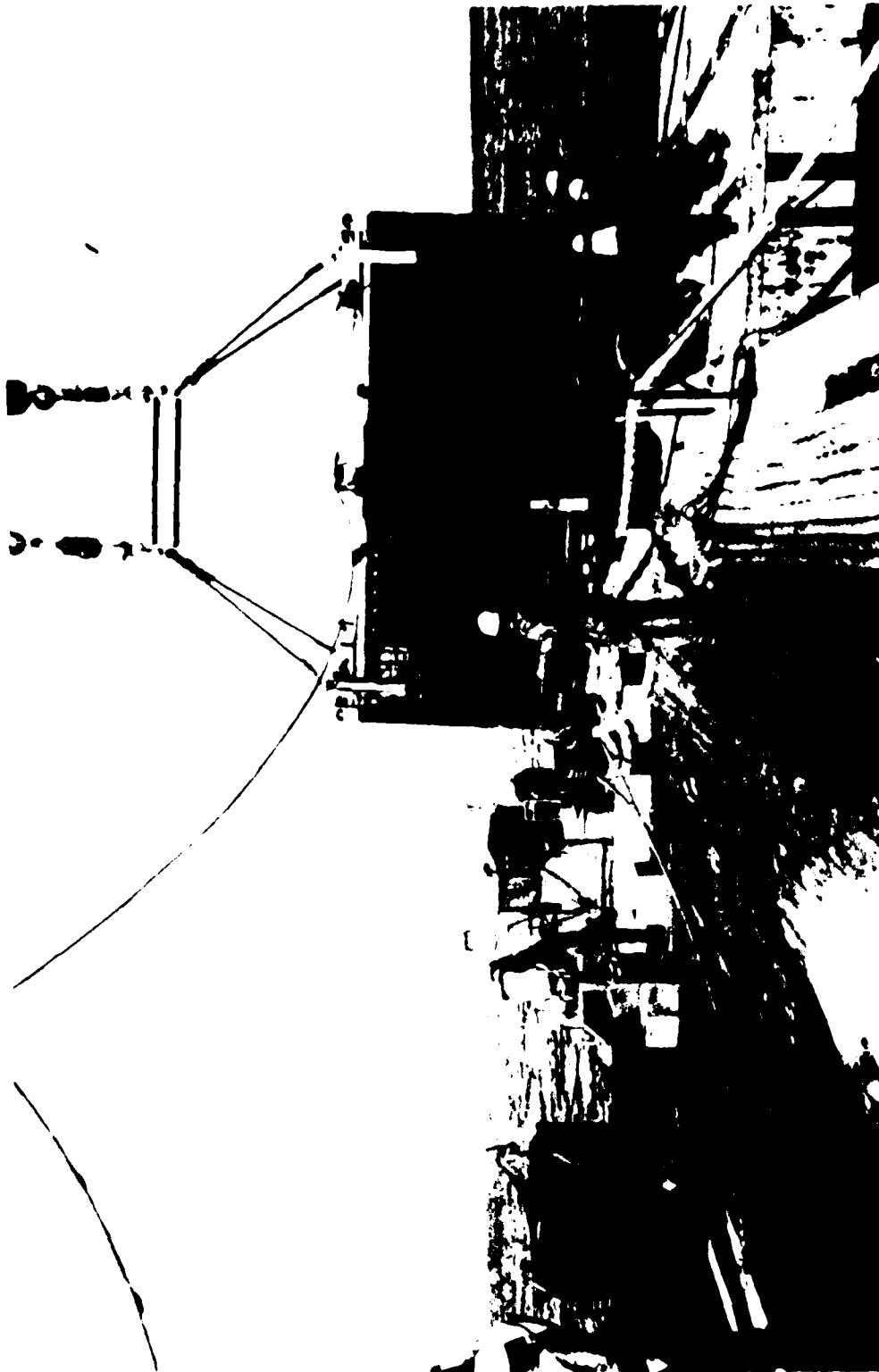


FIGURE D.45. ALIGNMENT DIFFICULT. Aligning the container with the trailer required four personnel to force the container into position so it would engage the corner fittings. Because the procedure was so time-consuming one trailer returned to the beach without being loaded.

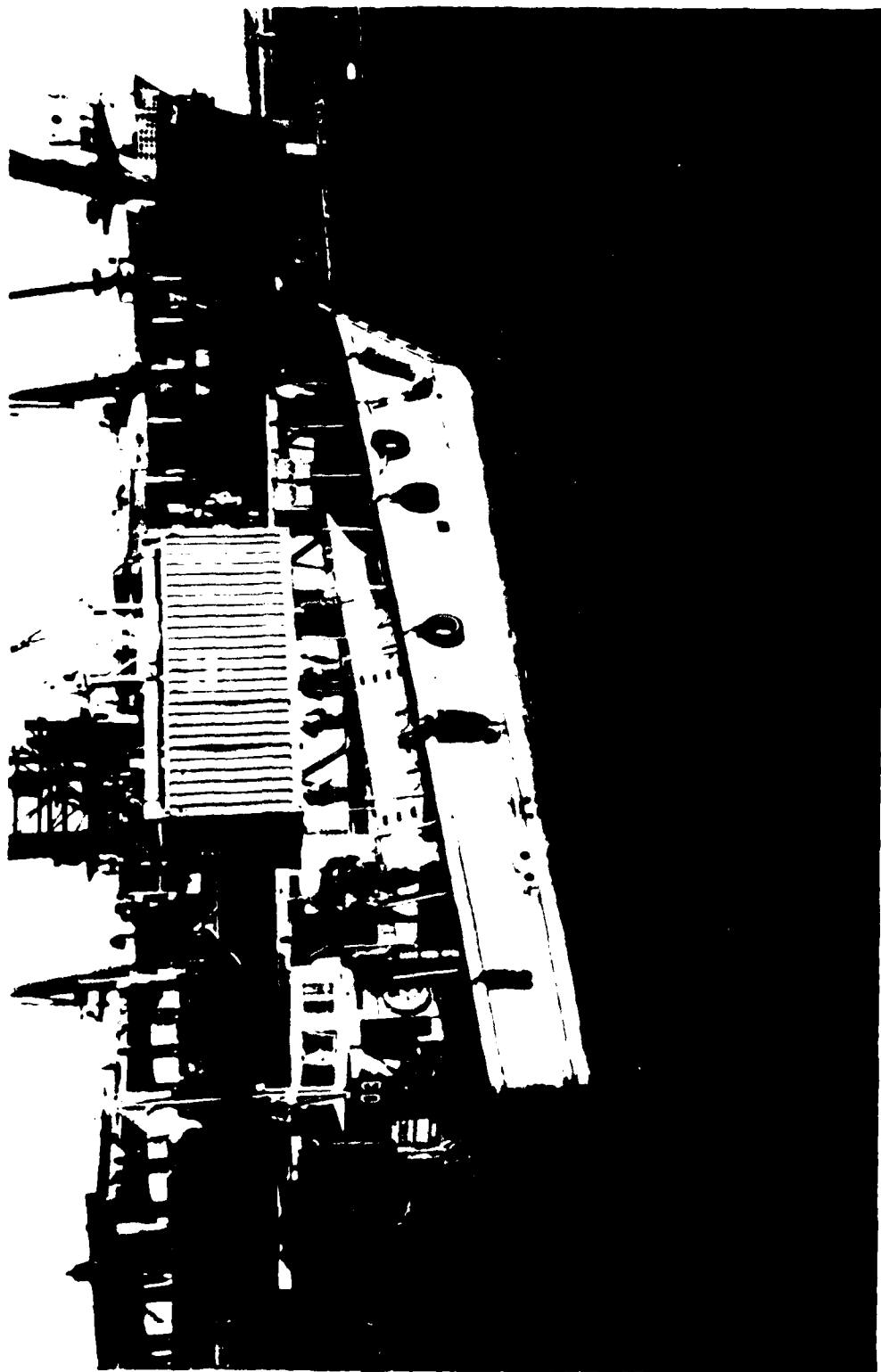


FIGURE D.46. LCM8s USED. LCM8 landing craft received extensive use in the pretest and had better beaching capabilities than LCUs, although both were unable to beach close enough to shore cranes at low tide.

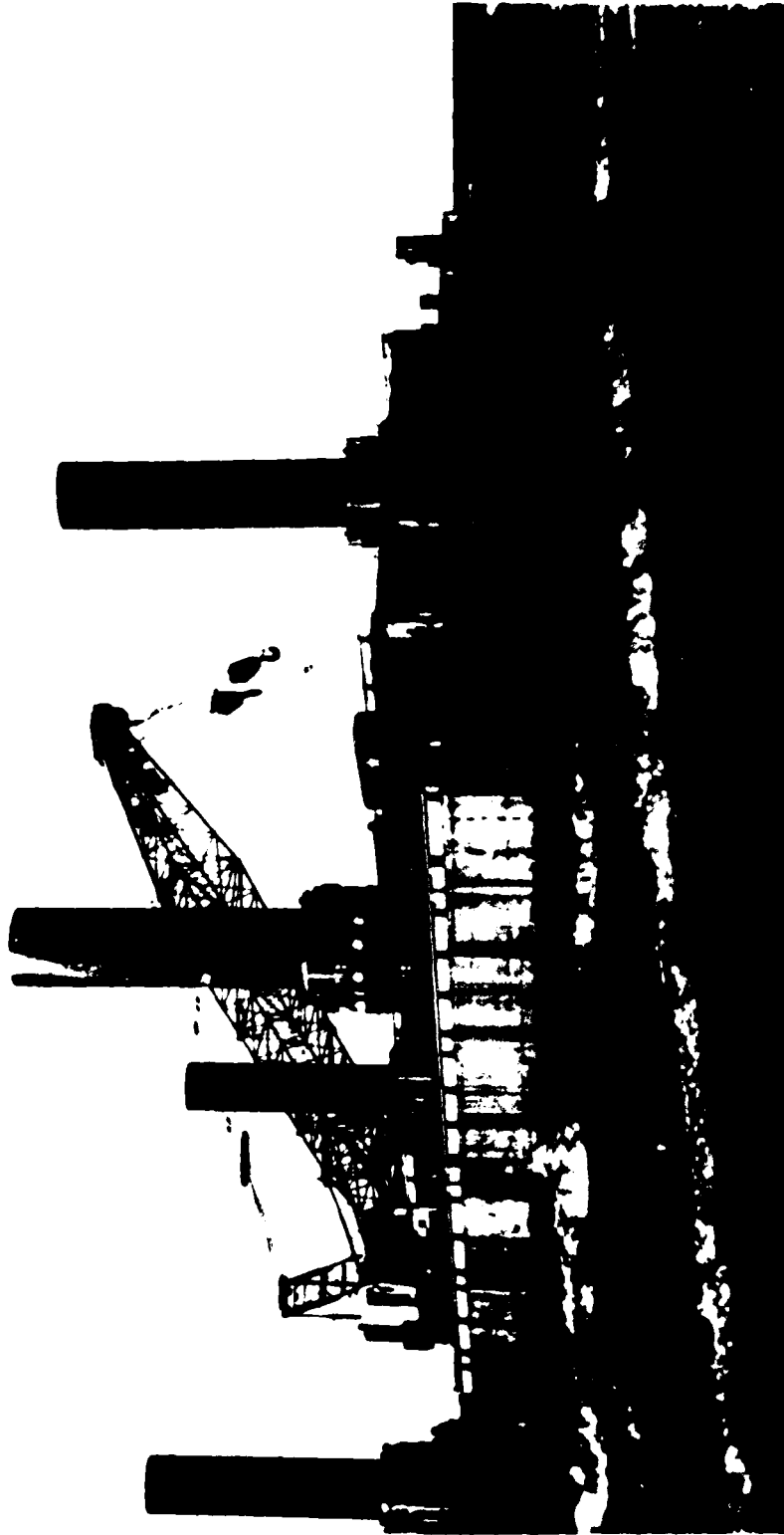


FIGURE D.47. DELONG PIER POSITIONED. To improve shoreside unloading capabilities a 140-ton crane was positioned on a DeLong barge and towed to the objective area. The DeLong was beached using two LCMs. Later the DeLong was jacked-up out of the water on its pilings and ramps were added so that trucks could drive from the beach onto the pier.



FIGURE D.48. LCU RETRACTS. An LCU is shown above retracting from the DeLong pier after unloading at high tide.



PLATE 149. LVT-1 (LVT-1) because of the gentle beach gradient and the fact that a single LVT does not extend far enough seaward, landing craft were stranded at low tide. At low tide only amphibians could be unloaded.



FIGURE 1.50. ABOVE: AL-BLEMS. Truck drivers experienced difficulty backing their trailers up the ramp so a rough terrain forklift, which has articulated steering, was tried. The above ALB ramp connects onto the Pelong ramps. The ALB ramp was subsequently replaced by a sand ramp.

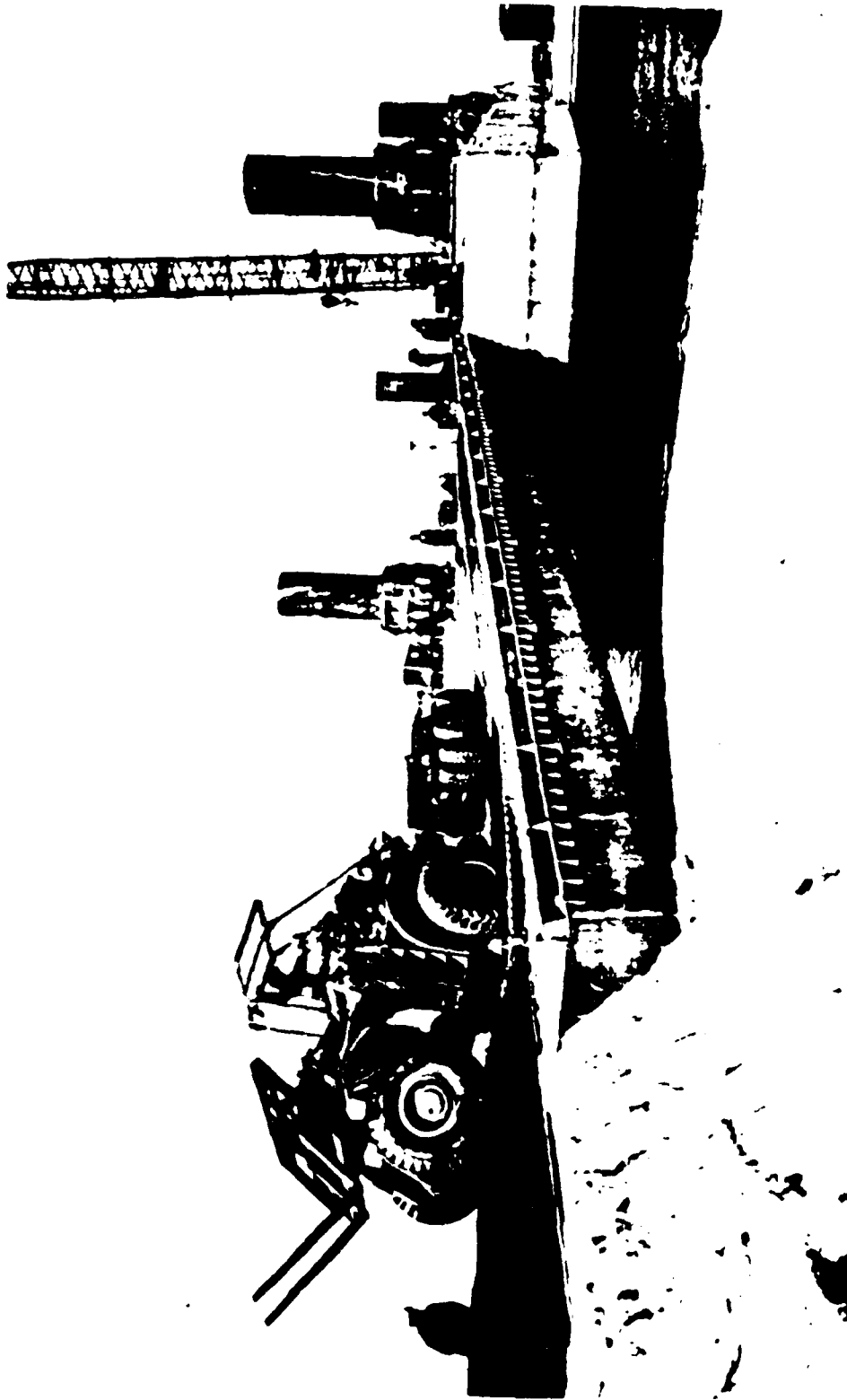


FIGURE D.51. CRANE DELAYED. Until the trailer was positioned under the crane, operations were choked. With experience drivers were able to more rapidly back their trailers up the ramp.

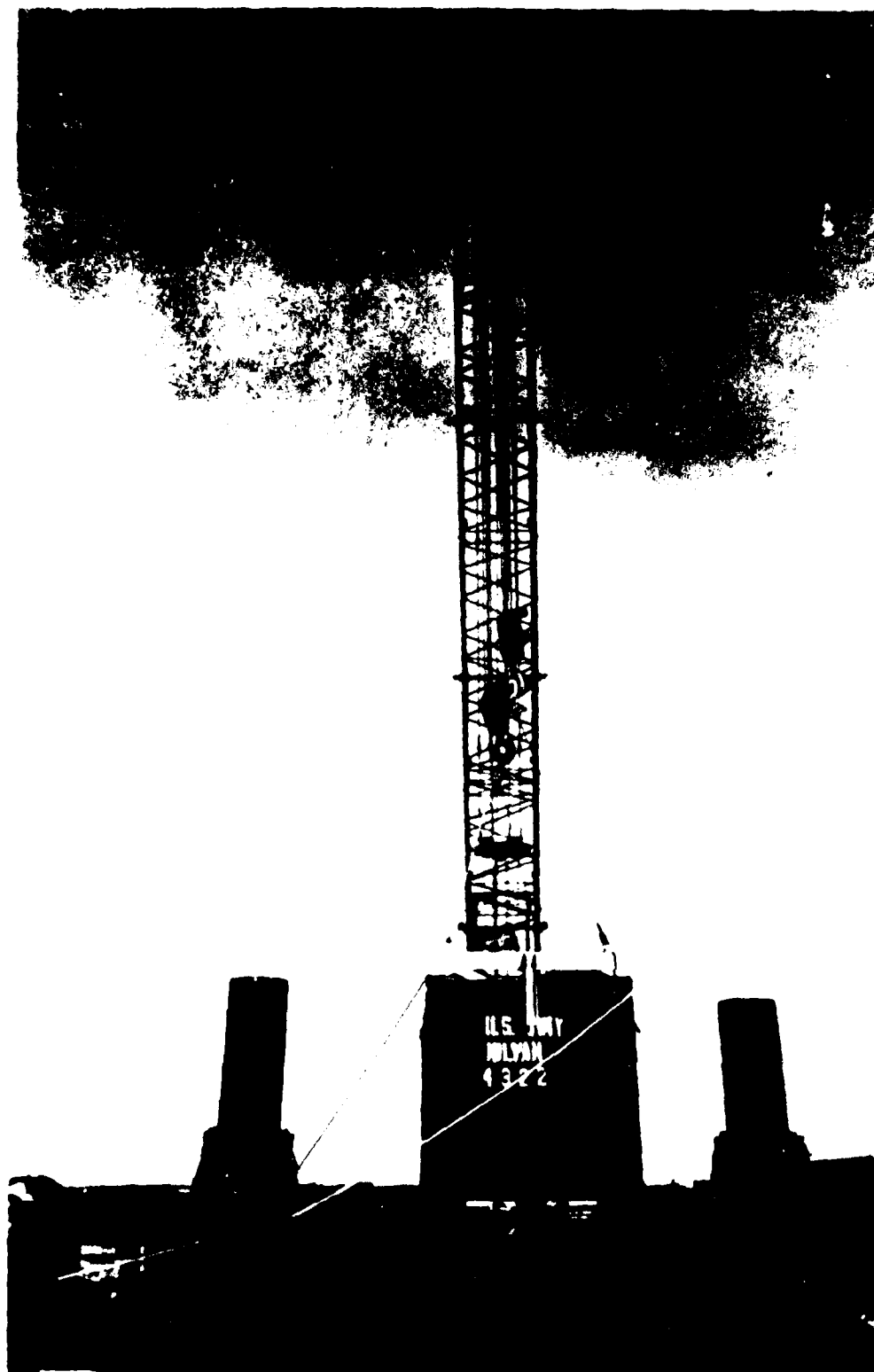


FIGURE 1. TRAILER IN POSITION. Once the milvan chassis was on the
beach, it was quickly loaded.



U.S. S.S. "W. M. BROWN" (1656) at high tide at Union Pier and easily moored to the second pier.



On 11/1/54, a small boat, possibly a tugboat, was seen in the vicinity of the boat mentioned in the report. The boat was seen from a distance and was not identified. The boat was seen in the vicinity of the boat mentioned in the report. The boat was seen in the vicinity of the boat mentioned in the report. The boat was seen in the vicinity of the boat mentioned in the report.

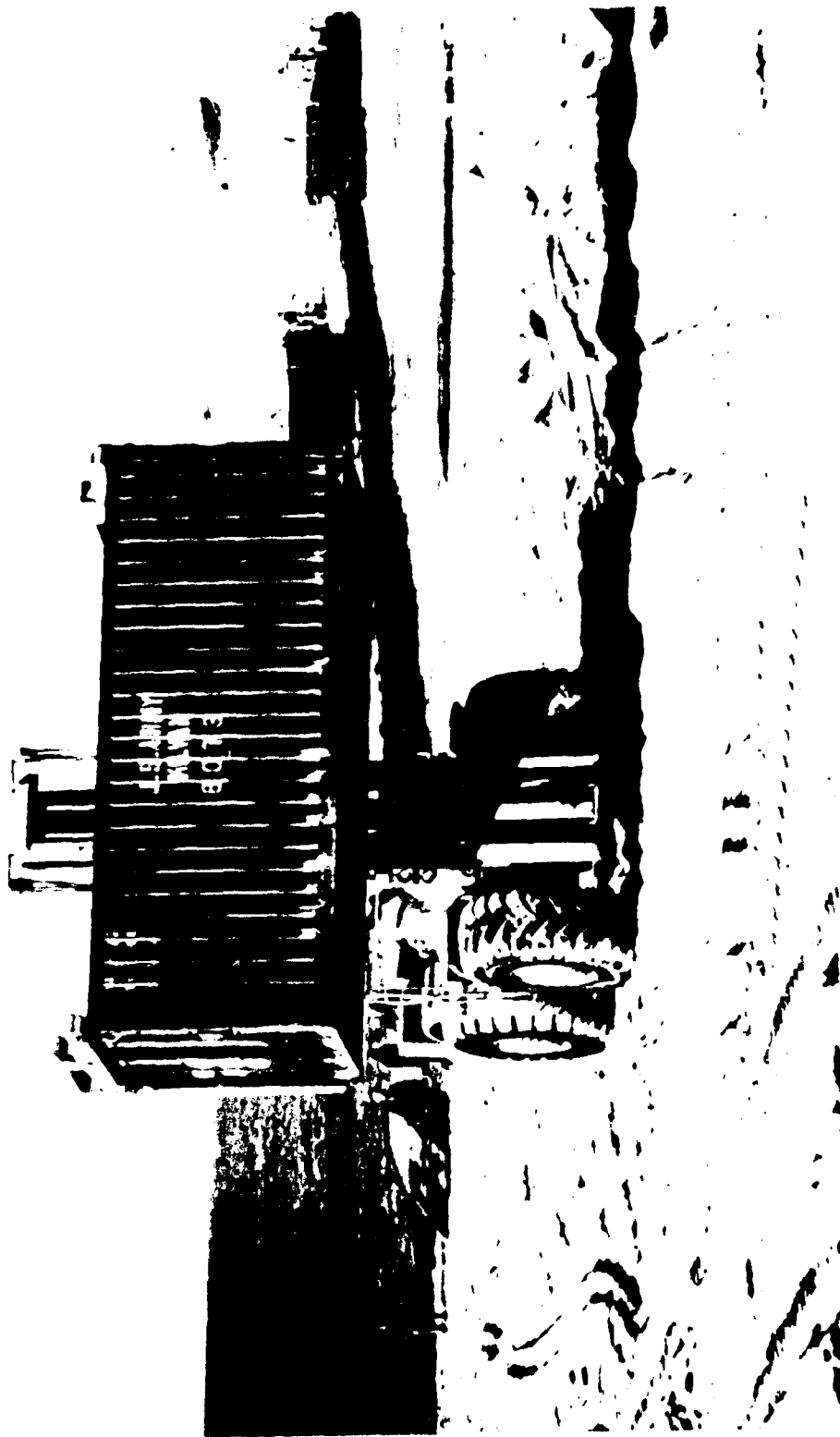


FIGURE 1. A large container being moved by a forklift. The large front loader carrying a 44-ton container from the quarry to the site of the dam. The large front loader was necessary to move the container.

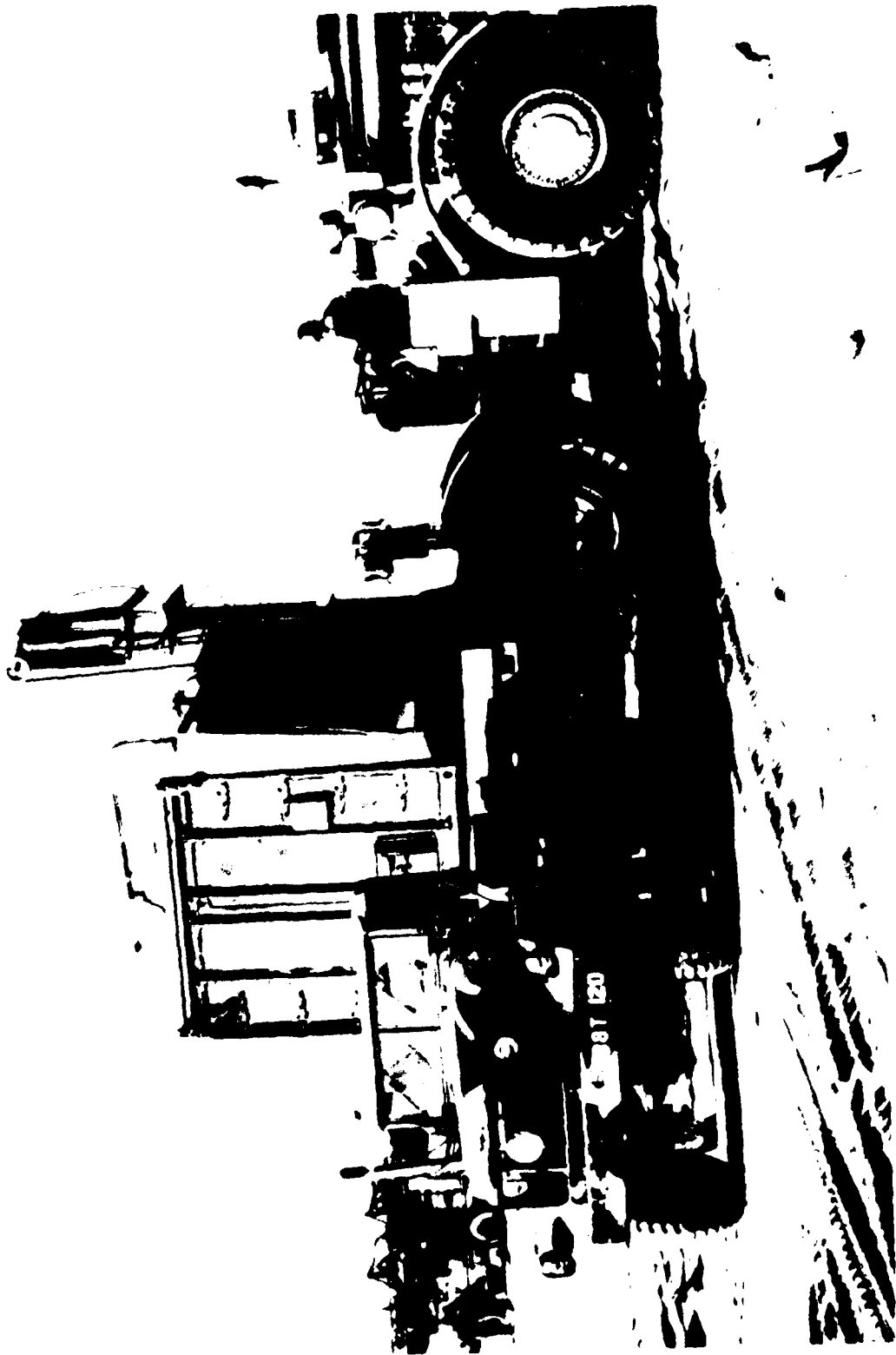


Fig. 1. The vehicle shown in the photograph above is loaded above by the front loader. The tire container was lifted up in the causway, and the tire was loaded onto the chassis required approximately 4 minutes.



U.S. Navy tank, 4222, during a night training exercise. The driver did not see the enemy, enemy soldiers had to be captured, captured, and then the enemy was captured or destroyed.

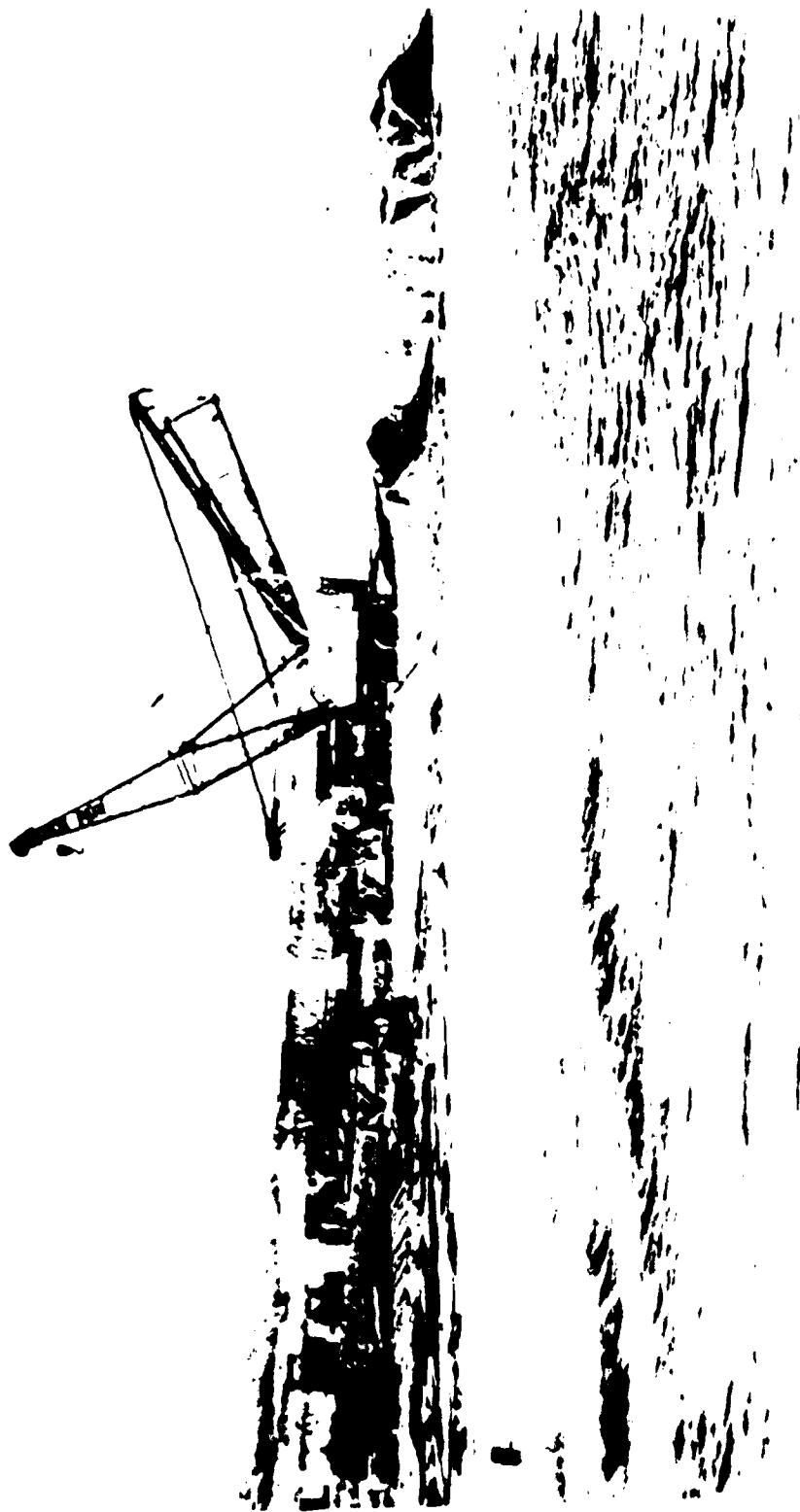


FIGURE 1. BEACH CRANE ASSEMBLY BEING. Once the 300-ton crane was landed and turned around, its assembly could be completed. It required 7 days before being operational, although no night operations were conducted and some of that time were spent reversing the crane due to the necessity of loading the crane in a manner opposite to its original orientation.

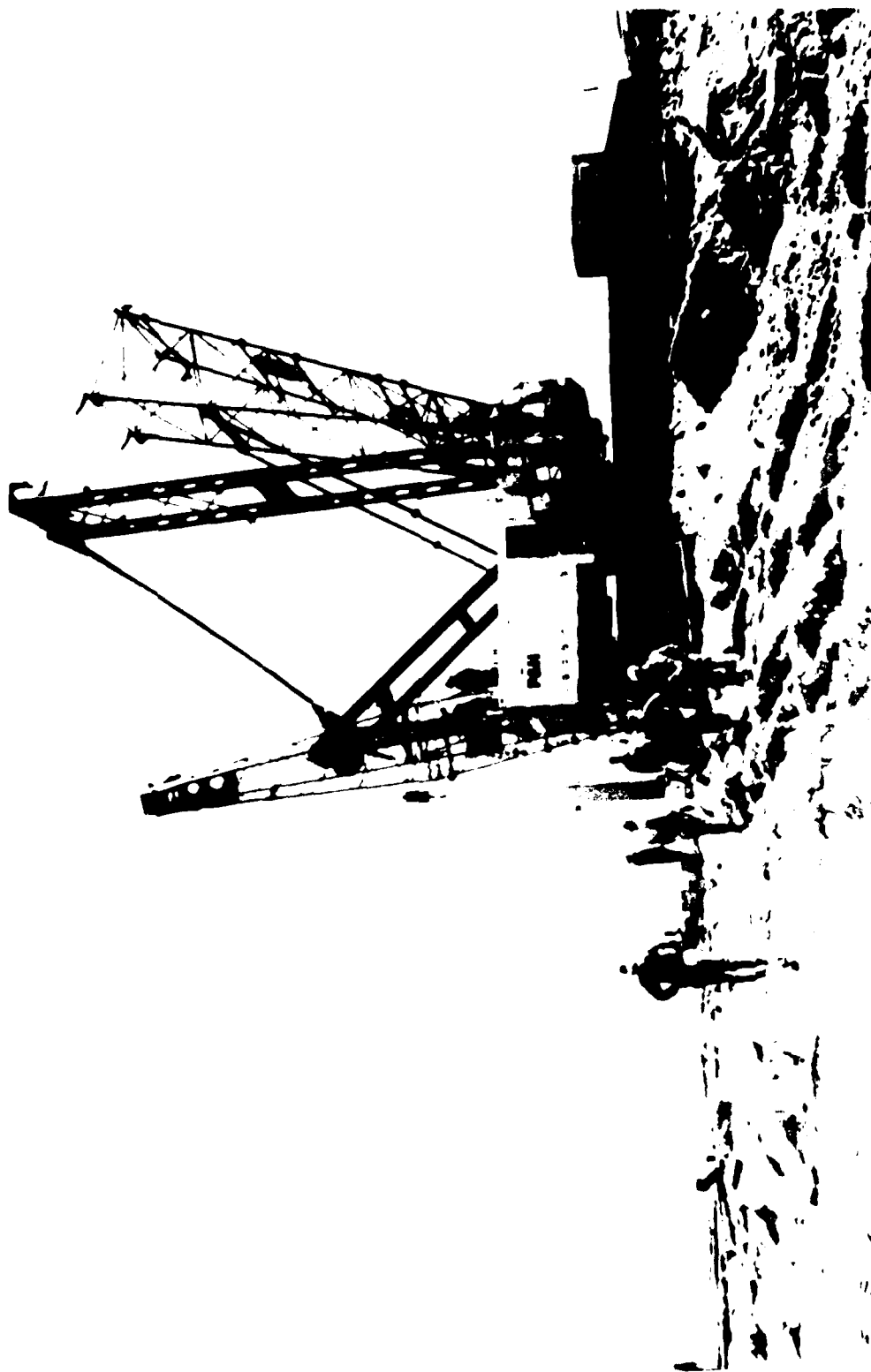


FIGURE D.59. 140-TON CRANE ASSISTS. To recover time lost in turning the 300-ton crane, a 140-ton crane assisted in reassembly. Normally, the 300-ton crane can make itself operational without assistance.

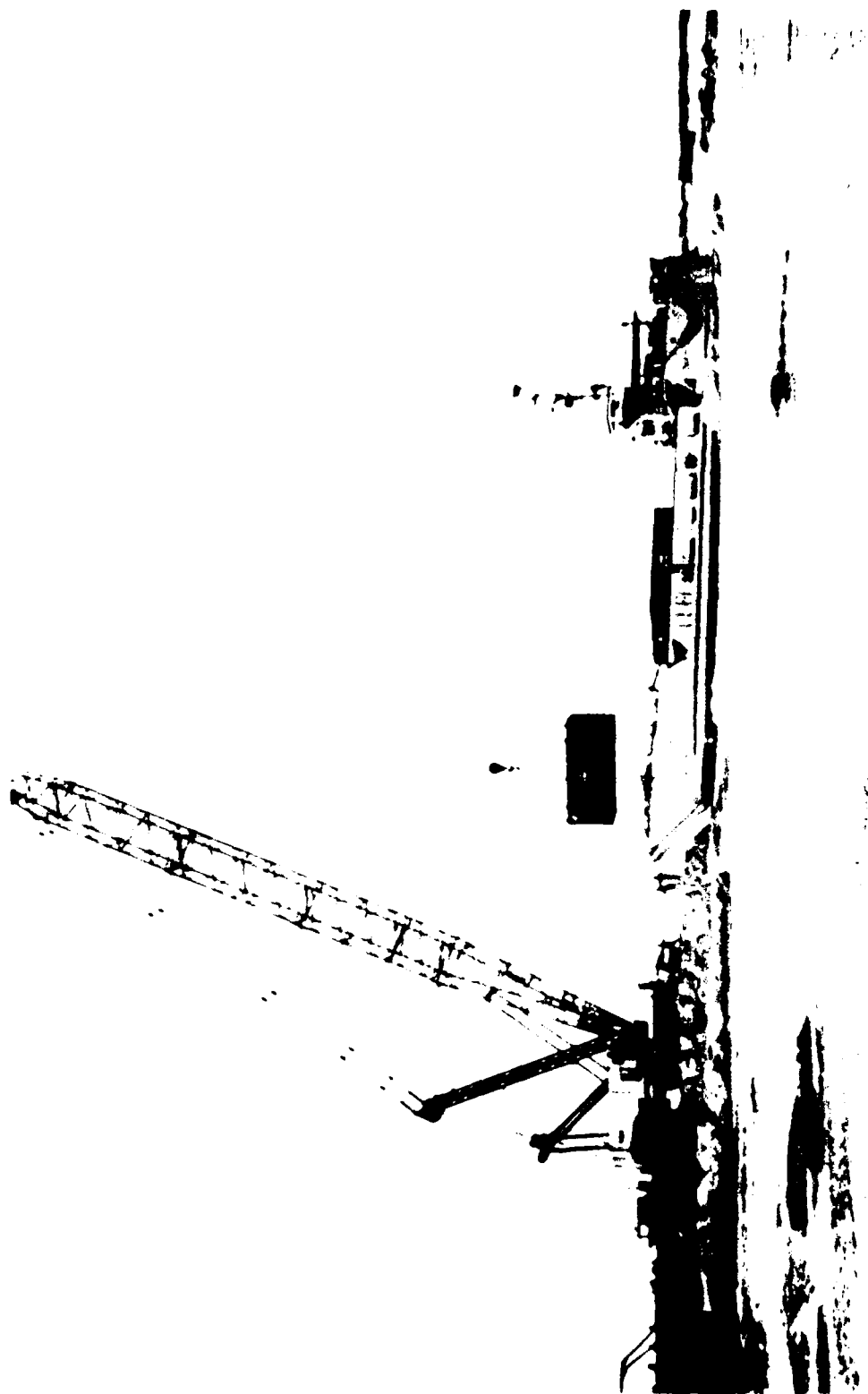


FIGURE D.60. HIGH TIDE OPERATIONS. At high tide landing craft were able to beach within reaching distance of the beach crane and were unloaded without difficulty.



FIGURE 1. A group of people gathered around a large, dark, rectangular object, possibly a vehicle or a large container. The image is heavily stylized, with most areas being either solid black or solid white, giving it a graphic, almost stencil-like appearance. The figures of the people are mostly white against a black background, and the large object is a large black shape. The overall composition is centered, with the group and object occupying most of the frame.



FIGURE 1. The large, dark, irregularly shaped object is the high water mark of the water level at the time the crane's boom reached the river, which water level was approximately 10 feet above the river bed when the crane's boom reached the river. The crane's boom is shown in the upper right corner of the photograph, and the tide cut is visible in the lower right corner.



FIGURE 3.63. CHANNEL DEPOSITION. In an effort to keep the beach crane operational a channel was dredged seaward of the crane by bulldozers.

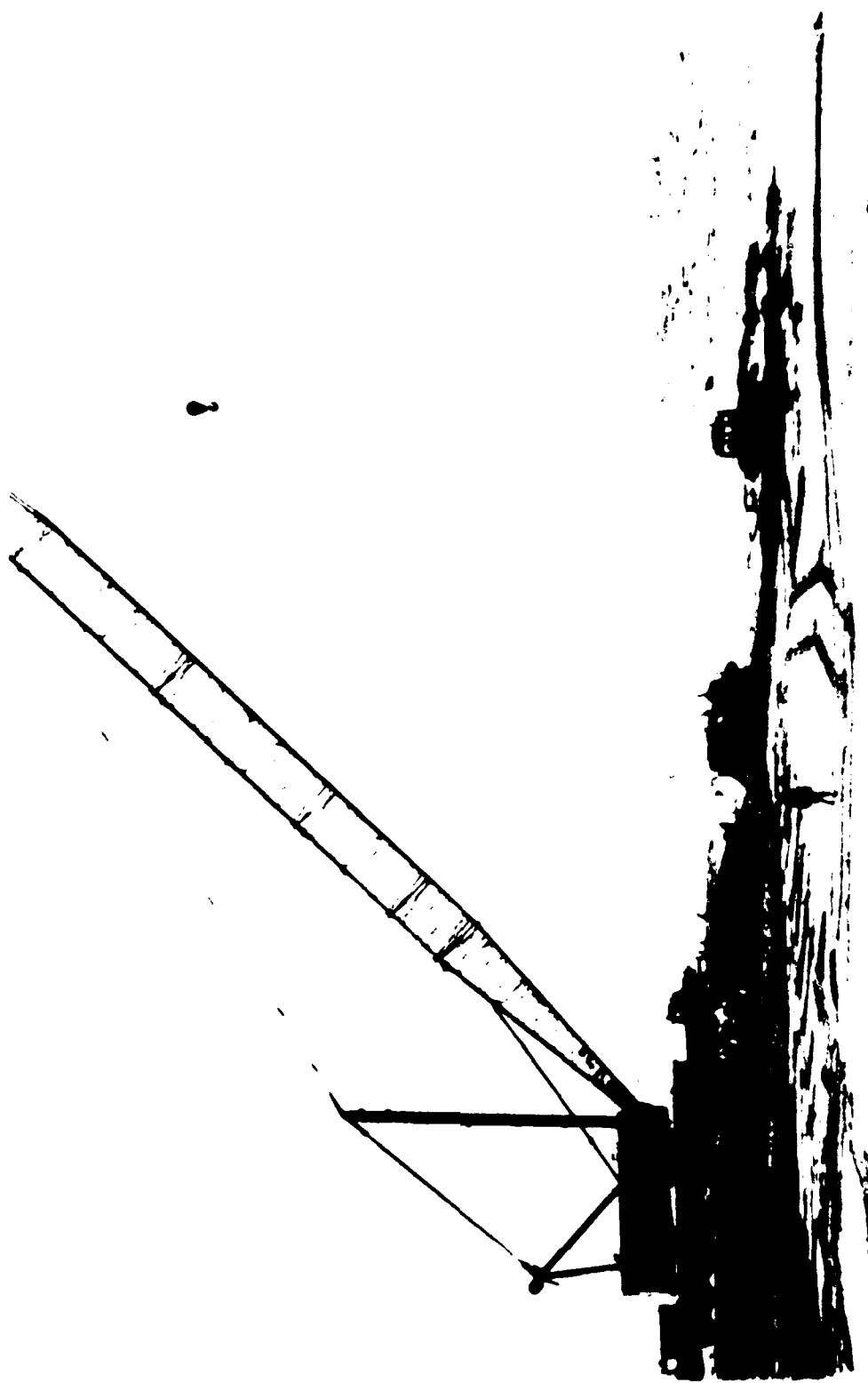


FIGURE D-64. CHANNEL 17 BY 14. After approximately 15 hr of dredging, it was apparent that a channel deep enough could not be excavated. The above photo was taken about 30 minutes before low tide.



FIGURE D.65. ROUGH WEATHER EXPERIENCED. Another problem was encountered when the surf and winds increased. The sand ramp upon which the crane had been placed began to erode and had to be repaired at high tide by dozers.

D-65

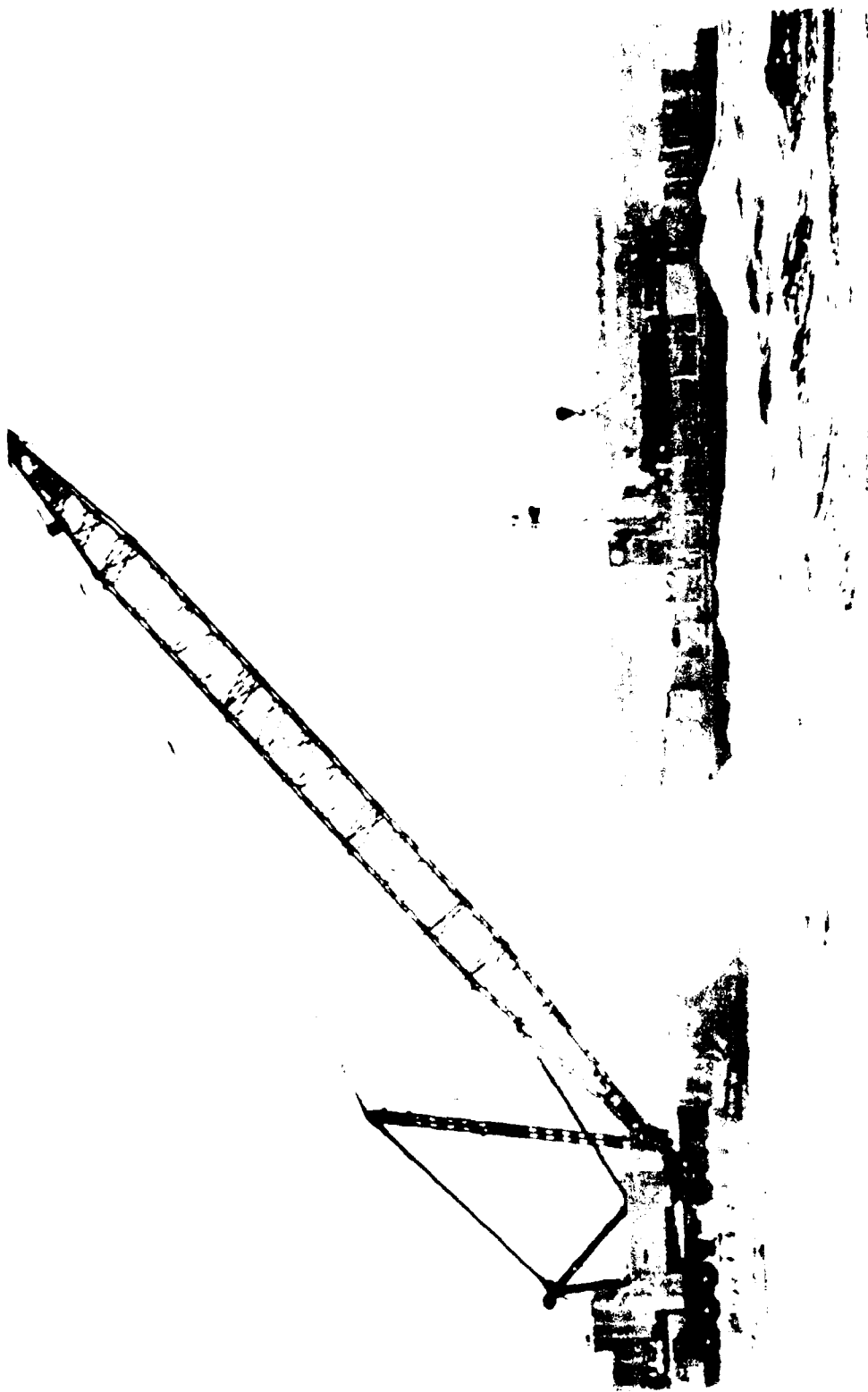


FIGURE 1.66. SOME CONTAINERS AT L. A. E. E. Some container unloading was possible before the heavy weather required cessation of operations.

[illegible]

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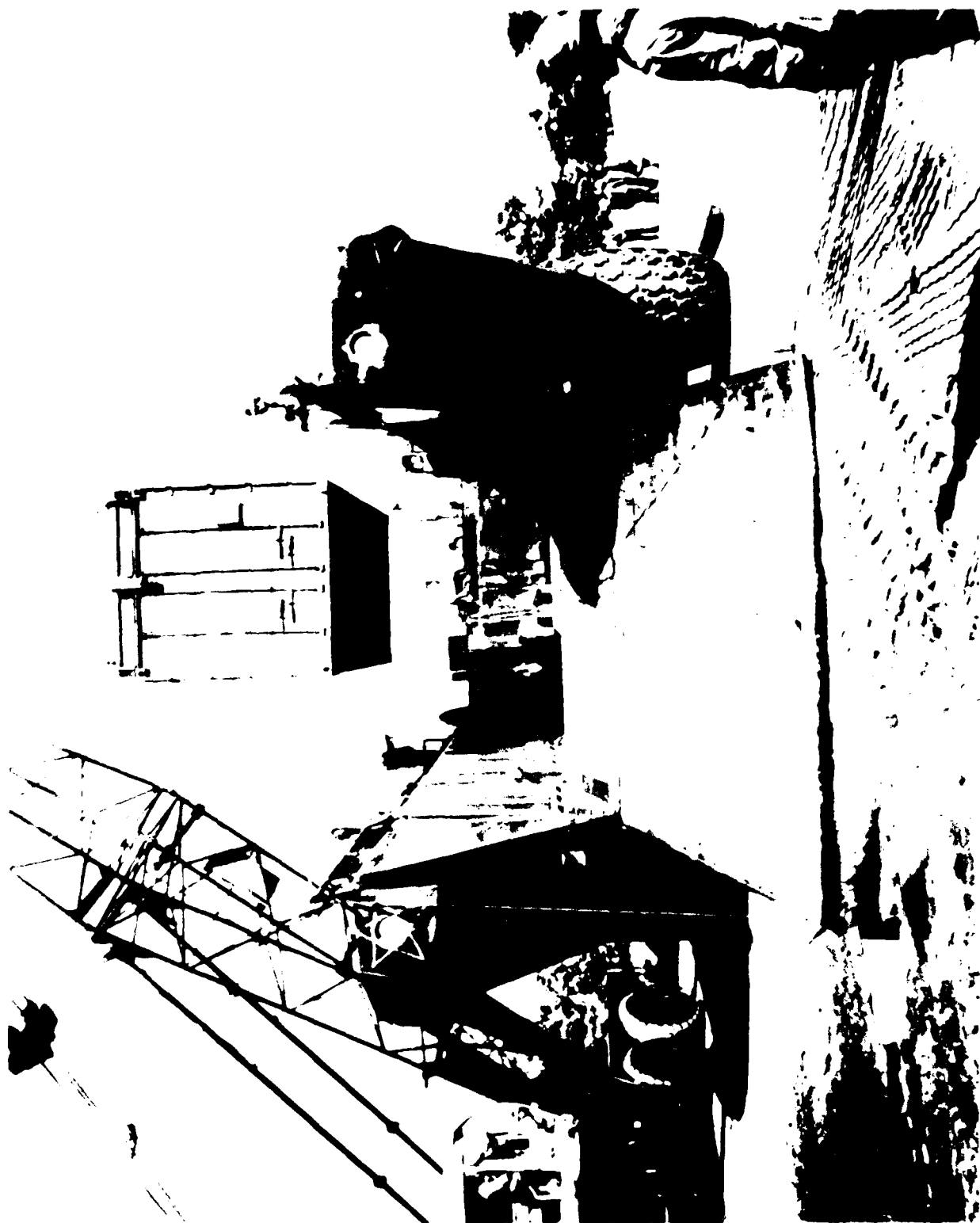


FIGURE 0.79. LARGELY UNLOADED. A WHEEL IS UNLOADED AT THE INSTALLING SITE BY A JACKSON CRANE.

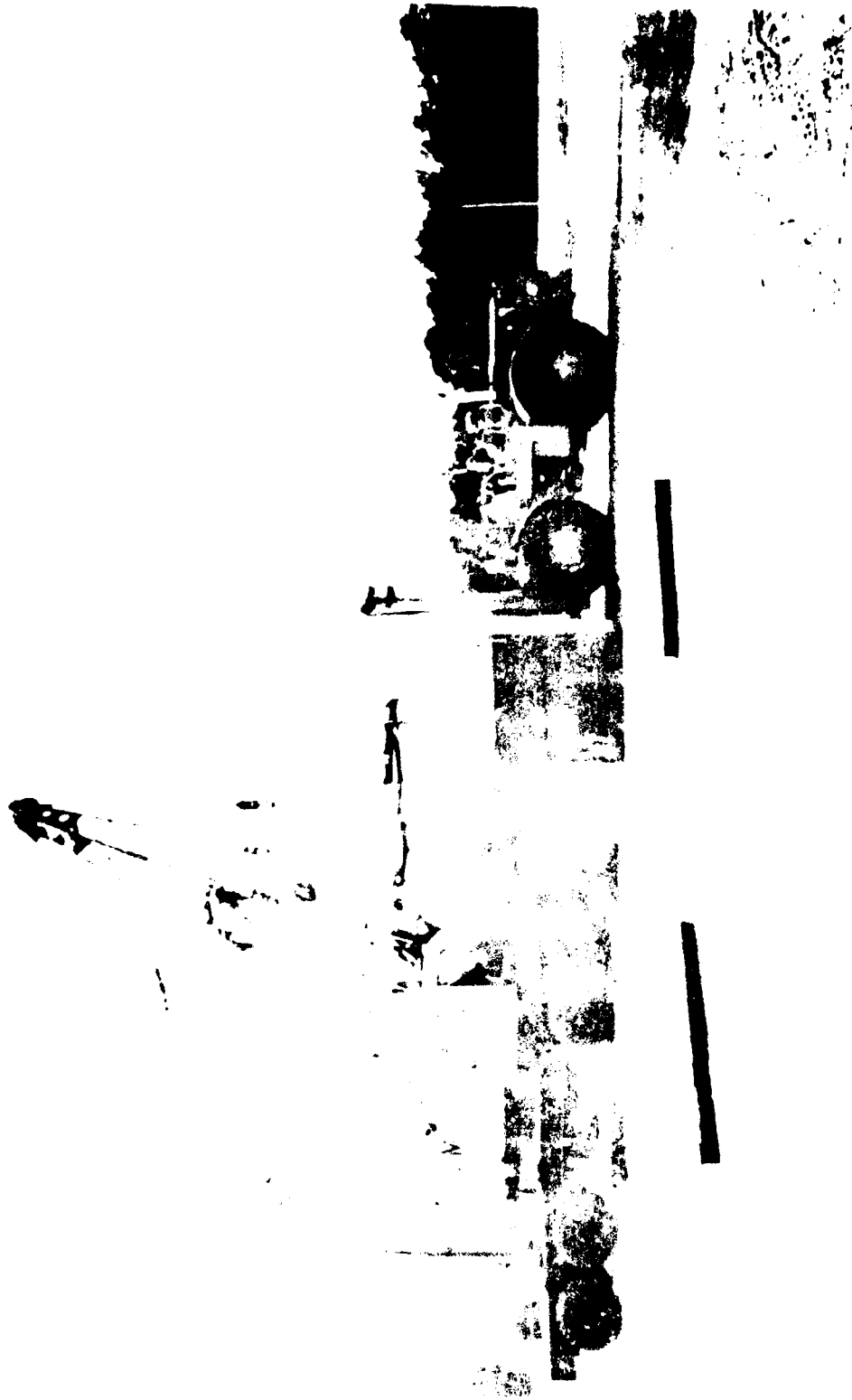


FIGURE D.71. FRONTLOADER CLEARS CONTAINER. Once a vehicle was unloaded a frontloader (above) or sideloader was used to clear the discharge point.

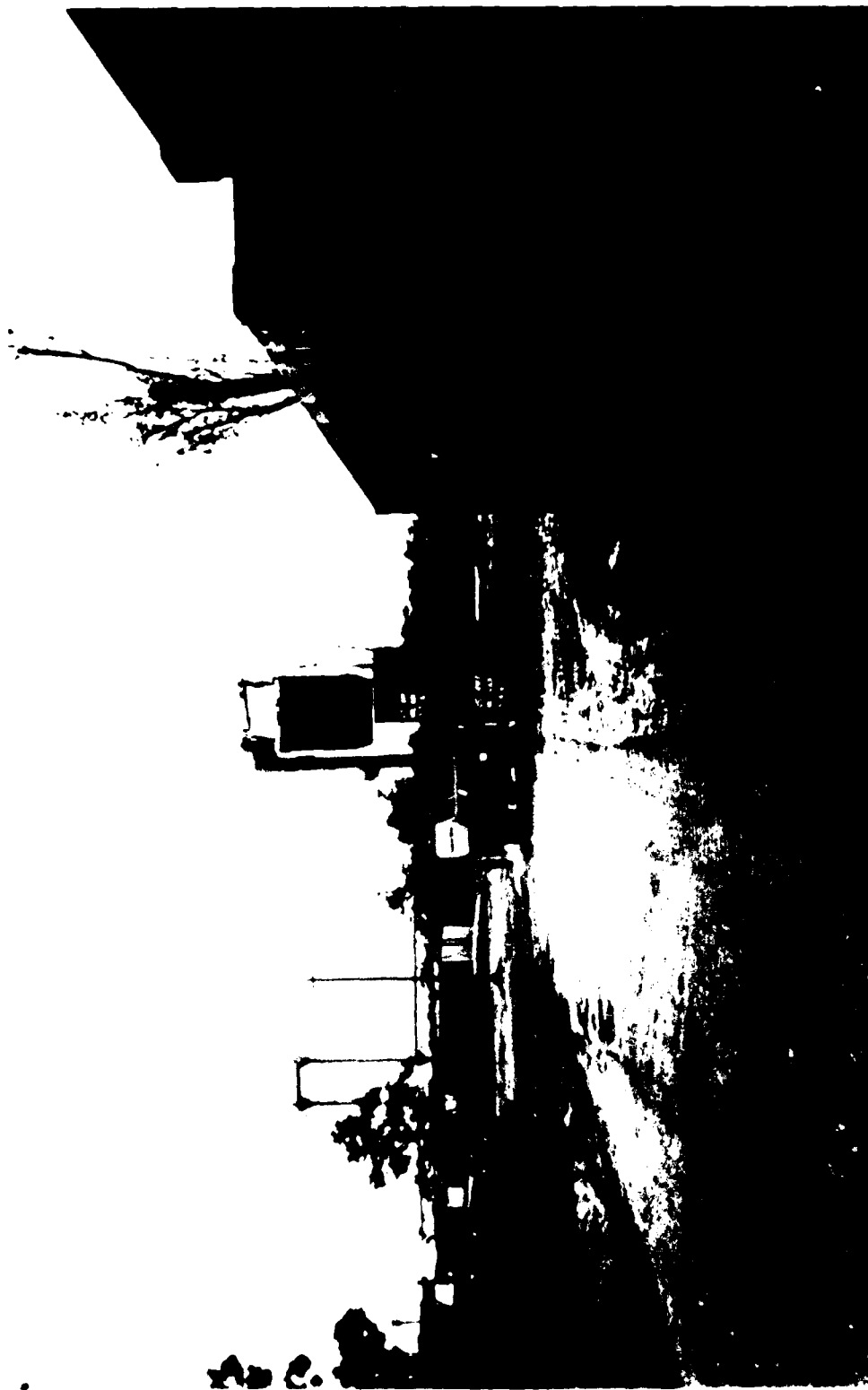


FIGURE D.72. SIDELOADER SAVES SPACE. A side loader (above) is used in the marshalling area to stack fully-loaded containers. Two and three high stacking saves marshalling area storage space. The side loader operates only on hard surfaces.

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